CHARLES R. JONAS U.S. COURTHOUSE MODERNIZATION AND ANNEX

FINAL DESIGN CONCEPT SUBMITTAL

OCTOBER 5TH, 2017

Jenkins • Peer *Architects*

RAMSA
ROBERT A.M. STERN ARCHITECTS

RICCIGREENEASSOCIATES

McKNIGHT - SMITH - WARD - GRIFFIN
ENGINEERS, INCORPORATED
PO Box 240826 - 4223 South Boulevard - Charlotte, NC 28224
704.527.2112 - FAX: 704.523.1315 - e-mail: mswg@mswg.com

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Concept Energy Model Analysis

The concept energy models are indicating energy savings of 23% for the new construction and 13.2% for the existing Jonas courthouse when comparing the proposed systems versus an ASHRAE 2013 baseline. The system input at this time are basic and do not have all the energy control measures in place as they are depending on a more detailed model. The current model is a block load based on exposures and floors, but is not a space by space model that will be developed as the project moves into design development. Once the model is developed we will target a savings in the range of 30-40% for the new annex, and 15-20% for the existing Jonas courthouse.

Project specific input data for the model is as follows:

Envelope

Annex
Walls: R-value = 18.77; U-value = 0.053
Roof: R-value = 36.41; U-value = 0.027
Glass: U-value = 0.25; Shade Coefficient = 0.25

Jonas
Walls: R-value = 5.52; U-factor = 0.181
Roof: R-value = 8.29; U-factor = 0.121
Glass: U-value = 0.25; Shade Coefficient = 0.25

Lighting: Baseline = 1.0W/sq. ft.; Proposed = 0.8W/sq.ft. (same in both the annex and the existing Jonas courthouse.

Plug loads: Equal in both the annex and the existing Jonas courthouse.

Outside Air: The area outdoor airflow rate is 0.06 CFM/sq.ft. for spaces in both the annex and the existing Jonas courthouse.

People Density: 100 sq. ft./person for office spaces; 70 people per 1000 sq. ft. for courtroom areas in both the annex and the existing Jonas courthouse.

The baseline building uses values proscribed by ASHRAE for these inputs.

Strategies to study in Design Development to achieve the prescribed energy savings are as follows:

- The model classifies the spaces by exposure and interior space and is not reflective of how the specific spaces will perform in the more detailed model. Our

experience is our models gain efficiency as more detailed input is used, specifically on a space by space basis.

- Reduced lighting wattages

- Chilled water plant operation – The building will use a combination of chillers, plate and frame heat exchangers and cooling towers to deliver chilled water to terminal devices. These devices will range from chilled water coils for outside air dehumidification (which will need an entering chilled water temperature of 42F) to chilled beams which will require an entering chilled water temperature of 60F. The chilled water distribution system will be designed to deliver these optimum water temperatures. For example chillers dedicated to chilled beams only will be considered (chiller operating at higher chilled water leaving temperatures are more efficient). Also water side economizers will be evaluated to provide chilled water to the beams, reducing the mechanical cooling energy. Finally chilled water distribution paths with higher delta Ts will be evaluated to reduce pumping energy.

- Boiler water plant operation – Similar to the chiller plant description, boilers dedicated to chilled beams only will be considered (boilers operating at lower hot water leaving temperatures are more efficient). Also hot water distribution paths with higher delta Ts will be evaluated to reduce pumping energy.

- Wireless Sensors and Analytics – For certain intermittently occupied spaces, the HVAC control system will pick up an input from the lighting occupancy sensors to "set back" the space temperatures after an extended period of absence. When a room is left unoccupied for more than 15 minutes (when the building is in occupied mode), the space set points for heating and cooling will be offset 1F (adjustable at the building management level to allow for more aggressive offsets if possible).

- Smart Scrubbers – Outside air in the model is based on ASHRAE 62. Technologies to reduce outside air will be evaluated to reduce load on the energy plants. It will also decrease the fan size of the DOA systems, saving on fan energy.

- Enthalpy based economizer on ventilation air systems - Using ambient air when favorable will reduce load on the energy plants. (VAV units that serve the courtrooms are already being modeled with economizer systems).

- Energy recovery on ventilation air systems – Energy recovery devices to reclaim energy from exhaust/relief air to reduce load to the energy plants. Additionally, energy recovery devices will be considered in lieu of a hot water reheat coils for ventilation air units.

- Outside air based on occupancy – Monitoring CO2 levels in the spaces and reducing ventilation air to those spaces when possible will reduce fan energy.

Annual Cost Summary

17-024 JONAS COURTHOUSE - PRELIMINARY 09/22/2017
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Table 1. Annual Costs

Component	[B000] BASELINE EXISTING ($)	PROPOSED EXISTING ($)
Air System Fans	15,208	21,073
Cooling	18,431	6,770
Heating	10,157	12,200
Pumps	17,406	8,349
Heat Rejection Fans	3,855	3,868
HVAC Sub-Total	**65,056**	**52,260**
Lights	26,263	21,320
Electric Equipment	39,044	39,559
Misc. Electric	0	0
Misc. Fuel Use	0	0
Non-HVAC Sub-Total	**65,307**	**60,879**
Grand Total	**130,363**	**113,139**

Table 2. Annual Cost per Unit Floor Area

Component	[B000] BASELINE EXISTING ($/ft²)	PROPOSED EXISTING ($/ft²)
Air System Fans	0.129	0.176
Cooling	0.156	0.057
Heating	0.086	0.102
Pumps	0.147	0.070
Heat Rejection Fans	0.033	0.032
HVAC Sub-Total	**0.551**	**0.436**
Lights	0.222	0.178
Electric Equipment	0.331	0.330
Misc. Electric	0.000	0.000
Misc. Fuel Use	0.000	0.000
Non-HVAC Sub-Total	**0.553**	**0.508**
Grand Total	**1.104**	**0.945**
Gross Floor Area (ft²)	118061.0	119741.0
Conditioned Floor Area (ft²)	118061.0	119741.0

Note: Values in this table are calculated using the Gross Floor Area.

Table 3. Component Cost as a Percentage of Total Cost

Component	[B000] BASELINE EXISTING (%)	PROPOSED EXISTING (%)
Air System Fans	11.7	18.6
Cooling	14.1	6.0
Heating	7.8	10.8
Pumps	13.4	7.4
Heat Rejection Fans	3.0	3.4
HVAC Sub-Total	**49.9**	**46.2**
Lights	20.1	18.8
Electric Equipment	30.0	35.0
Misc. Electric	0.0	0.0
Misc. Fuel Use	0.0	0.0
Non-HVAC Sub-Total	**50.1**	**53.8**
Grand Total	**100.0**	**100.0**

Annual Energy and Emissions Summary

17-024 JONAS COURTHOUSE - PRELIMINARY 09/22/2017
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Table 1. Annual Costs

Component	[B000] BASELINE EXISTING ($)	PROPOSED EXISTING ($)
HVAC Components		
Electric	54,900	40,061
Natural Gas	10,157	12,200
Fuel Oil	0	0
Propane	0	0
Remote HW	0	0
Remote Steam	0	0
Remote CW	0	0
HVAC Sub-Total	**65,056**	**52,262**
Non-HVAC Components		
Electric	65,307	60,878
Natural Gas	0	0
Fuel Oil	0	0
Propane	0	0
Remote HW	0	0
Remote Steam	0	0
Non-HVAC Sub-Total	**65,307**	**60,878**
Grand Total	**130,363**	**113,140**

Table 2. Annual Energy Consumption

Component	[B000] BASELINE EXISTING	PROPOSED EXISTING
HVAC Components		
Electric (kWh)	695,813	507,749
Natural Gas (Therm)	8,733	10,490
Fuel Oil (na)	0	0
Propane (na)	0	0
Remote HW (na)	0	0
Remote Steam (na)	0	0
Remote CW (na)	0	0
Non-HVAC Components		
Electric (kWh)	827,722	771,590
Natural Gas (Therm)	0	0
Fuel Oil (na)	0	0
Propane (na)	0	0
Remote HW (na)	0	0
Remote Steam (na)	0	0
Totals		
Electric (kWh)	1,523,535	1,279,339
Natural Gas (Therm)	8,733	10,490
Fuel Oil (na)	0	0
Propane (na)	0	0
Remote HW (na)	0	0
Remote Steam (na)	0	0
Remote CW (na)	0	0

Table 3. Annual Emissions

Component	[B000] BASELINE EXISTING	PROPOSED EXISTING
CO2 Equivalent (lb)	0	0

Annual Energy and Emissions Summary

17-024 JONAS COURTHOUSE - PRELIMINARY 09/22/2017
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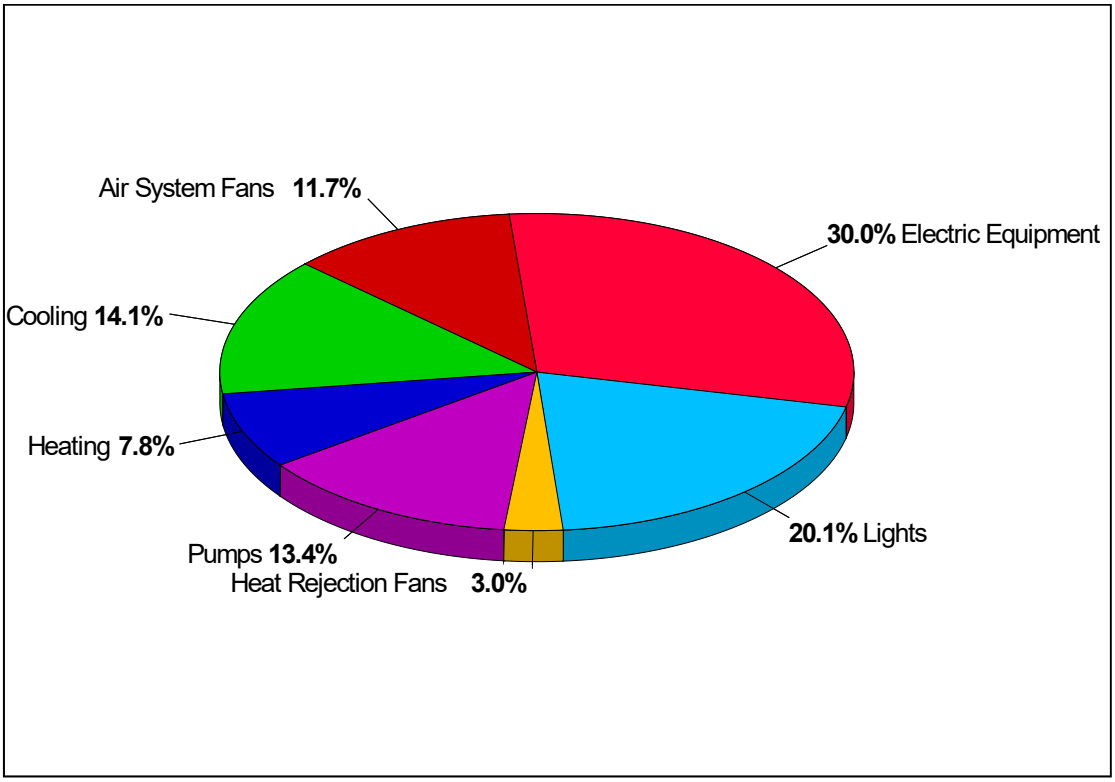
Table 4. Annual Cost per Unit Floor Area

Component	[B000] BASELINE EXISTING ($/ft²)	PROPOSED EXISTING ($/ft²)
HVAC Components		
Electric	0.465	0.335
Natural Gas	0.086	0.102
Fuel Oil	0.000	0.000
Propane	0.000	0.000
Remote HW	0.000	0.000
Remote Steam	0.000	0.000
Remote CW	0.000	0.000
HVAC Sub-Total	**0.551**	**0.437**
Non-HVAC Components		
Electric	0.553	0.508
Natural Gas	0.000	0.000
Fuel Oil	0.000	0.000
Propane	0.000	0.000
Remote HW	0.000	0.000
Remote Steam	0.000	0.000
Non-HVAC Sub-Total	**0.553**	**0.508**
Grand Total	**1.104**	**0.945**
Gross Floor Area (ft²)	118061.0	119741.0
Conditioned Floor Area (ft²)	118061.0	119741.0

Note: Values in this table are calculated using the Gross Floor Area.

Table 5. Component Cost as a Percentage of Total Cost

Component	[B000] BASELINE EXISTING (%)	PROPOSED EXISTING (%)
HVAC Components		
Electric	42.1	35.4
Natural Gas	7.8	10.8
Fuel Oil	0.0	0.0
Propane	0.0	0.0
Remote HW	0.0	0.0
Remote Steam	0.0	0.0
Remote CW	0.0	0.0
HVAC Sub-Total	**49.9**	**46.2**
Non-HVAC Components		
Electric	50.1	53.8
Natural Gas	0.0	0.0
Fuel Oil	0.0	0.0
Propane	0.0	0.0
Remote HW	0.0	0.0
Remote Steam	0.0	0.0
Non-HVAC Sub-Total	**50.1**	**53.8**
Grand Total	**100.0**	**100.0**



1. Annual Costs

Component	Annual Cost ($)	($/ft²)	Percent of Total (%)
Air System Fans	15,208	0.129	11.7
Cooling	18,431	0.156	14.1
Heating	10,157	0.086	7.8
Pumps	17,406	0.147	13.4
Heat Rejection Fans	3,855	0.033	3.0
HVAC Sub-Total	**65,056**	**0.551**	**49.9**
Lights	26,263	0.222	20.1
Electric Equipment	39,044	0.331	30.0
Misc. Electric	0	0.000	0.0
Misc. Fuel Use	0	0.000	0.0
Non-HVAC Sub-Total	**65,307**	**0.553**	**50.1**
Grand Total	**130,363**	**1.104**	**100.0**

Note: Cost per unit floor area is based on the gross building floor area.

Gross Floor Area ..... **118061.0** ft²
Conditioned Floor Area **118061.0** ft²

Annual Energy Costs - [B000] BASELINE EXISTING

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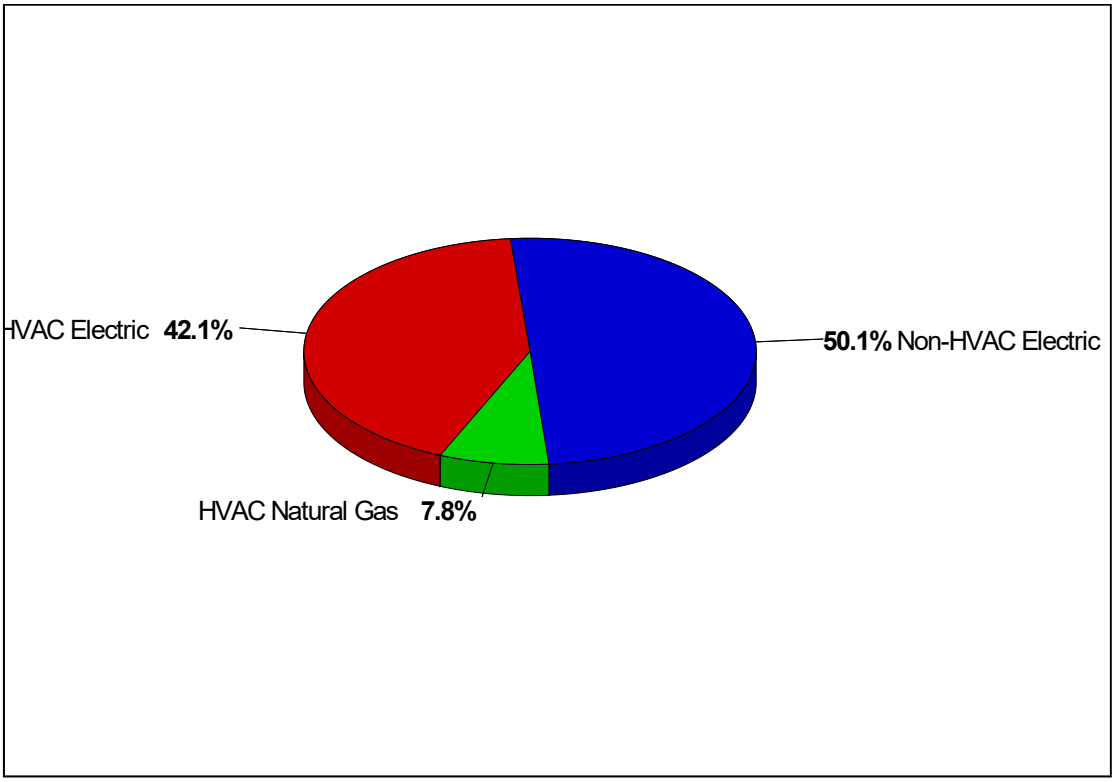
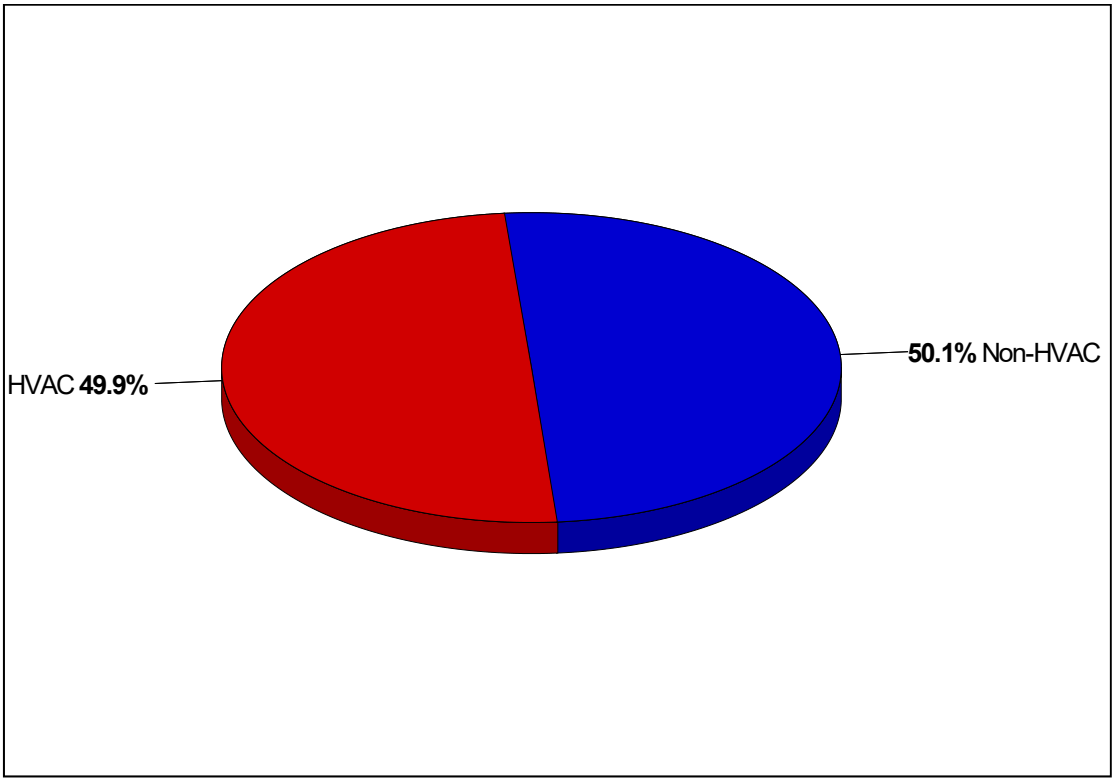


1. Annual Costs

Component	Annual Cost ($/yr)	($/ft²)	Percent of Total (%)
HVAC Components			
Electric	54,900	0.465	42.1
Natural Gas	10,157	0.086	7.8
Fuel Oil	0	0.000	0.0
Propane	0	0.000	0.0
Remote Hot Water	0	0.000	0.0
Remote Steam	0	0.000	0.0
Remote Chilled Water	0	0.000	0.0
HVAC Sub-Total	**65,056**	**0.551**	**49.9**
Non-HVAC Components			
Electric	65,307	0.553	50.1
Natural Gas	0	0.000	0.0
Fuel Oil	0	0.000	0.0
Propane	0	0.000	0.0
Remote Hot Water	0	0.000	0.0
Remote Steam	0	0.000	0.0
Non-HVAC Sub-Total	**65,307**	**0.553**	**50.1**
Grand Total	**130,363**	**1.104**	**100.0**

Note: Cost per unit floor area is based on the gross building floor area.

Gross Floor Area ..... **118061.0** ft²
Conditioned Floor Area **118061.0** ft²



1. Annual Costs

Component	Annual Cost ($/yr)	($/ft²)	Percent of Total (%)
HVAC	65,056	0.551	49.9
Non-HVAC	65,307	0.553	50.1
Grand Total	**130,363**	**1.104**	**100.0**

Note: Cost per unit floor area is based on the gross building floor area.

Gross Floor Area ..... **118061.0** ft²
Conditioned Floor Area **118061.0** ft²

Energy Budget by System Component - [B000] BASELINE EXISTING

17-024 JONAS COURTHOUSE - PRELIMINARY 09/22/2017
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1. Annual Coil Loads

Component	Load (kBTU)	(kBTU/ft²)
Cooling Coil Loads	4,795,353	40.618
Heating Coil Loads	722,481	6.120
Grand Total	**5,517,834**	**46.737**

2. Energy Consumption by System Component

Component	Site Energy (kBTU)	Site Energy (kBTU/ft²)	Source Energy (kBTU)	Source Energy (kBTU/ft²)
Air System Fans	657,676	5.571	2,348,842	19.895
Cooling	797,047	6.751	2,846,597	24.111
Heating	873,304	7.397	873,304	7.397
Pumps	752,697	6.376	2,688,203	22.770
Heat Rejection Fans	166,690	1.412	595,322	5.043
HVAC Sub-Total	**3,247,414**	**27.506**	**9,352,268**	**79.216**
Lights	1,135,717	9.620	4,056,132	34.356
Electric Equipment	1,688,449	14.302	6,030,174	51.077
Misc. Electric	0	0.000	0	0.000
Misc. Fuel Use	0	0.000	0	0.000
Non-HVAC Sub-Total	**2,824,166**	**23.921**	**10,086,306**	**85.433**
Grand Total	**6,071,579**	**51.427**	**19,438,574**	**164.649**

Notes:
1. 'Cooling Coil Loads' is the sum of all air system cooling coil loads.
2. 'Heating Coil Loads' is the sum of all air system heating coil loads.
3. Site Energy is the actual energy consumed.
4. Source Energy is the site energy divided by the electric generating efficiency (28.0%).
5. Source Energy for fuels equals the site energy value.
6. Energy per unit floor area is based on the gross building floor area.
   Gross Floor Area ..... **118061.0** ft²
   Conditioned Floor Area ..... **118061.0** ft²

1. Annual Coil Loads

Component	Load (kBTU)	(kBTU/ft²)
Cooling Coil Loads	4,795,353	40.618
Heating Coil Loads	722,481	6.120
Grand Total	**5,517,834**	**46.737**

2. Energy Consumption by Energy Source

Component	Site Energy (kBTU)	Site Energy (kBTU/ft²)	Source Energy (kBTU)	Source Energy (kBTU/ft²)
HVAC Components				
Electric	2,374,113	20.109	8,478,975	71.819
Natural Gas	873,304	7.397	873,304	7.397
Fuel Oil	0	0.000	0	0.000
Propane	0	0.000	0	0.000
Remote Hot Water	0	0.000	0	0.000
Remote Steam	0	0.000	0	0.000
Remote Chilled Water	0	0.000	0	0.000
HVAC Sub-Total	**3,247,417**	**27.506**	**9,352,279**	**79.216**
Non-HVAC Components				
Electric	2,824,187	23.921	10,086,382	85.434
Natural Gas	0	0.000	0	0.000
Fuel Oil	0	0.000	0	0.000
Propane	0	0.000	0	0.000
Remote Hot Water	0	0.000	0	0.000
Remote Steam	0	0.000	0	0.000
Non-HVAC Sub-Total	**2,824,187**	**23.921**	**10,086,382**	**85.434**
Grand Total	**6,071,604**	**51.428**	**19,438,661**	**164.649**

Notes:
1. 'Cooling Coil Loads' is the sum of all air system cooling coil loads.
2. 'Heating Coil Loads' is the sum of all air system heating coil loads.
3. Site Energy is the actual energy consumed.
4. Source Energy is the site energy divided by the electric generating efficiency (28.0%).
5. Source Energy for fuels equals the site energy value.
6. Energy per unit floor area is based on the gross building floor area.
   Gross Floor Area ..... **118061.0** ft²
   Conditioned Floor Area ..... **118061.0** ft²

Monthly Component Costs - [B000] BASELINE EXISTING

17-024 JONAS COURTHOUSE - PRELIMINARY 09/22/2017
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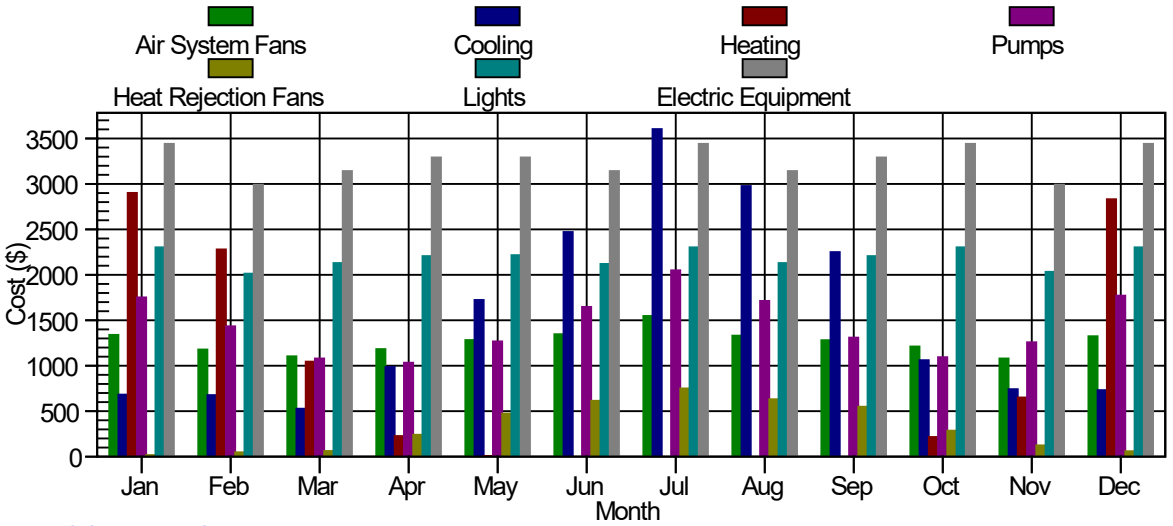
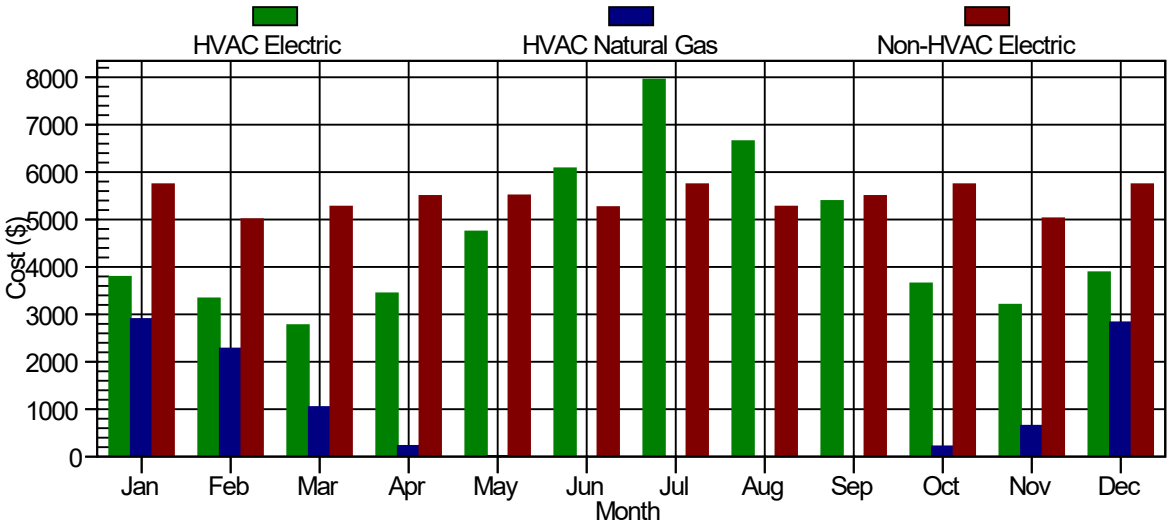


1. HVAC Component Costs

Month	Air System Fans ($)	Cooling ($)	Heating ($)	Pumps ($)	Heat Rejection Fans ($)	HVAC Total ($)
January	1,340	682	2,901	1,751	17	6,691
February	1,179	677	2,279	1,434	47	5,616
March	1,104	527	1,045	1,080	61	3,817
April	1,183	986	226	1,033	241	3,669
May	1,282	1,723	7	1,267	473	4,752
June	1,347	2,470	0	1,647	614	6,078
July	1,547	3,603	0	2,049	750	7,949
August	1,331	2,977	0	1,713	631	6,652
September	1,281	2,250	0	1,309	549	5,389
October	1,211	1,061	216	1,094	286	3,868
November	1,079	742	651	1,258	124	3,854
December	1,324	732	2,831	1,771	60	6,718
Total	**15,208**	**18,431**	**10,157**	**17,406**	**3,855**	**65,056**

2. Non-HVAC Component Costs

Month	Lights ($)	Electric Equipment ($)	Misc. Electric ($)	Misc. Fuel Use ($)	Non-HVAC Total ($)	Grand Total ($)
January	2,302	3,441	0	0	5,743	12,434
February	2,013	2,992	0	0	5,005	10,621
March	2,130	3,141	0	0	5,271	9,088
April	2,206	3,291	0	0	5,497	9,166
May	2,216	3,291	0	0	5,507	10,259
June	2,120	3,141	0	0	5,261	11,339
July	2,302	3,441	0	0	5,743	13,692
August	2,130	3,141	0	0	5,271	11,923
September	2,206	3,291	0	0	5,497	10,886
October	2,302	3,441	0	0	5,743	9,611
November	2,033	2,992	0	0	5,025	8,879
December	2,302	3,441	0	0	5,743	12,461
Total	**26,263**	**39,044**	**0**	**0**	**65,307**	**130,363**



1. HVAC Costs

Month	Electric ($)	Natural Gas ($)	Fuel Oil ($)	Propane ($)	Remote Hot Water ($)	Remote Steam ($)	Remote Chilled Water ($)
January	3,790	2,901	0	0	0	0	0
February	3,337	2,279	0	0	0	0	0
March	2,772	1,045	0	0	0	0	0
April	3,442	226	0	0	0	0	0
May	4,746	7	0	0	0	0	0
June	6,079	0	0	0	0	0	0
July	7,950	0	0	0	0	0	0
August	6,652	0	0	0	0	0	0
September	5,390	0	0	0	0	0	0
October	3,652	216	0	0	0	0	0
November	3,203	651	0	0	0	0	0
December	3,887	2,831	0	0	0	0	0
Total	**54,900**	**10,157**	**0**	**0**	**0**	**0**	**0**

2. Non-HVAC Costs

Month	Electric ($)	Natural Gas ($)	Fuel Oil ($)	Propane ($)	Remote Hot Water ($)	Remote Steam ($)
January	5,743	0	0	0	0	0
February	5,005	0	0	0	0	0
March	5,271	0	0	0	0	0
April	5,497	0	0	0	0	0
May	5,507	0	0	0	0	0
June	5,261	0	0	0	0	0
July	5,743	0	0	0	0	0
August	5,271	0	0	0	0	0
September	5,497	0	0	0	0	0
October	5,743	0	0	0	0	0
November	5,025	0	0	0	0	0
December	5,743	0	0	0	0	0
Total	**65,307**	**0**	**0**	**0**	**0**	**0**

Monthly Energy Use by Component - [B000] BASELINE EXISTING

17-024 JONAS COURTHOUSE - PRELIMINARY 09/22/2017
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1. Monthly Energy Use by System Component

Component	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Air System Fans (kWh)	16978	14937	13989	14991	16253	17070	19612	16871	16235	15354	13679	16784
Cooling												
Electric (kWh)	8648	8581	6684	12493	21843	31312	45670	37727	28520	13446	9404	9274
Natural Gas (Therm)	0	0	0	0	0	0	0	0	0	0	0	0
Fuel Oil (na)	0	0	0	0	0	0	0	0	0	0	0	0
Propane (na)	0	0	0	0	0	0	0	0	0	0	0	0
Remote HW (na)	0	0	0	0	0	0	0	0	0	0	0	0
Remote Steam (na)	0	0	0	0	0	0	0	0	0	0	0	0
Remote CW (na)	0	0	0	0	0	0	0	0	0	0	0	0
Heating												
Electric (kWh)	0	0	0	0	0	0	0	0	0	0	0	0
Natural Gas (Therm)	2494	1960	898	195	6	0	0	0	0	186	559	2434
Fuel Oil (na)	0	0	0	0	0	0	0	0	0	0	0	0
Propane (na)	0	0	0	0	0	0	0	0	0	0	0	0
Remote HW (na)	0	0	0	0	0	0	0	0	0	0	0	0
Remote Steam (na)	0	0	0	0	0	0	0	0	0	0	0	0
Pumps (kWh)	22198	18169	13685	13094	16059	20877	25972	21709	16594	13861	15942	22444
Heat Rej. Fans (kWh)	213	601	779	3052	6001	7787	9511	7998	6961	3623	1570	757
Lighting (kWh)	29182	25511	26992	27958	28087	26863	29182	26992	27958	29182	25768	29182
Electric Eqpt. (kWh)	43608	37920	39816	41712	41712	39816	43608	39816	41712	43608	37920	43608
Misc. Electric (kWh)	0	0	0	0	0	0	0	0	0	0	0	0
Misc. Fuel												
Natural Gas (Therm)	0	0	0	0	0	0	0	0	0	0	0	0
Propane (na)	0	0	0	0	0	0	0	0	0	0	0	0
Remote HW (na)	0	0	0	0	0	0	0	0	0	0	0	0
Remote Steam (na)	0	0	0	0	0	0	0	0	0	0	0	0

1. HVAC Energy Use

Month	Electric (kWh)	Natural Gas (Therm)	Fuel Oil (na)	Propane (na)	Remote HW (na)	Remote Steam (na)	Remote CW (na)
Jan	48,037	2,494	0	0	0	0	0
Feb	42,289	1,960	0	0	0	0	0
Mar	35,137	898	0	0	0	0	0
Apr	43,631	195	0	0	0	0	0
May	60,156	6	0	0	0	0	0
Jun	77,045	0	0	0	0	0	0
Jul	100,764	0	0	0	0	0	0
Aug	84,304	0	0	0	0	0	0
Sep	68,311	0	0	0	0	0	0
Oct	46,284	186	0	0	0	0	0
Nov	40,596	559	0	0	0	0	0
Dec	49,259	2,434	0	0	0	0	0
Totals	695,813	8,733	0	0	0	0	0

2. Non-HVAC Energy Use

Month	Electric (kWh)	Natural Gas (Therm)	Fuel Oil (na)	Propane (na)	Remote HW (na)	Remote Steam (na)
Jan	72,791	0	0	0	0	0
Feb	63,431	0	0	0	0	0
Mar	66,809	0	0	0	0	0
Apr	69,671	0	0	0	0	0
May	69,800	0	0	0	0	0
Jun	66,680	0	0	0	0	0
Jul	72,791	0	0	0	0	0
Aug	66,809	0	0	0	0	0
Sep	69,671	0	0	0	0	0
Oct	72,791	0	0	0	0	0
Nov	63,689	0	0	0	0	0
Dec	72,791	0	0	0	0	0
Totals	827,722	0	0	0	0	0

Annual Component Costs - PROPOSED EXISTING

17-024 JONAS COURTHOUSE - PRELIMINARY 09/22/2017
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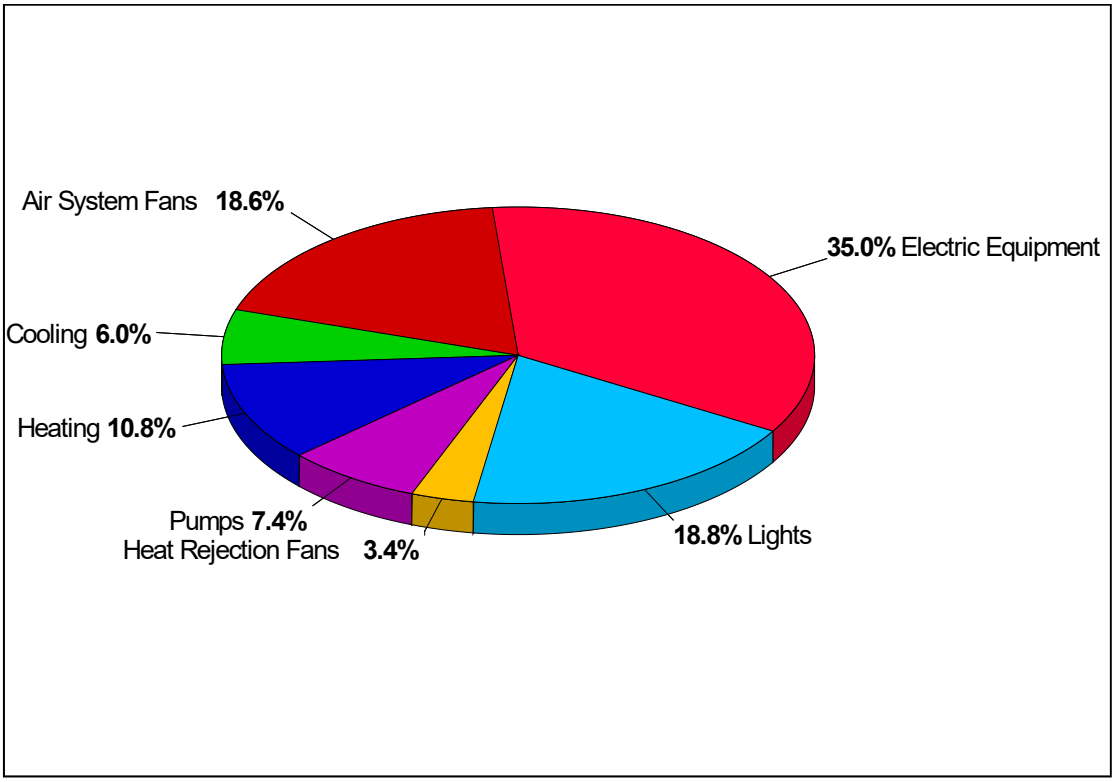
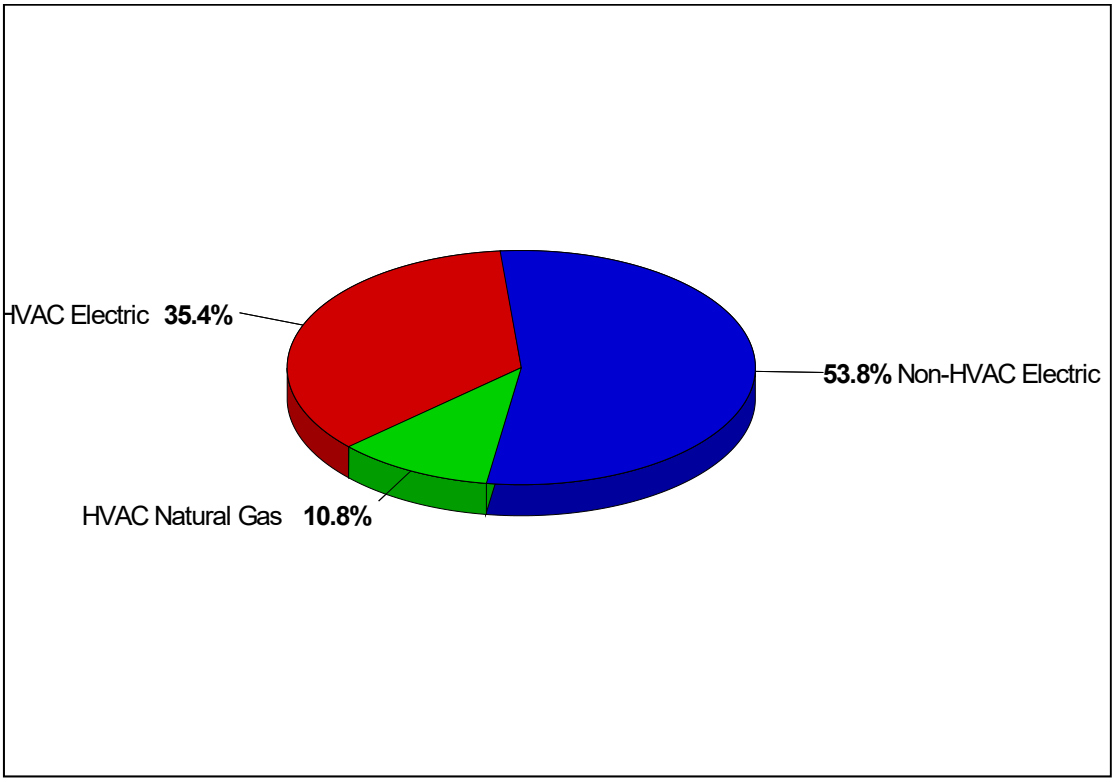


1. Annual Costs

Component	Annual Cost ($)	($/ft²)	Percent of Total (%)
Air System Fans	21,073	0.176	18.6
Cooling	6,770	0.057	6.0
Heating	12,200	0.102	10.8
Pumps	8,349	0.070	7.4
Heat Rejection Fans	3,868	0.032	3.4
HVAC Sub-Total	**52,260**	**0.436**	**46.2**
Lights	21,320	0.178	18.8
Electric Equipment	39,559	0.330	35.0
Misc. Electric	0	0.000	0.0
Misc. Fuel Use	0	0.000	0.0
Non-HVAC Sub-Total	**60,879**	**0.508**	**53.8**
Grand Total	**113,139**	**0.945**	**100.0**

Note: Cost per unit floor area is based on the gross building floor area.

Gross Floor Area ..... **119741.0** ft²
Conditioned Floor Area **119741.0** ft²



1. Annual Costs

Component	Annual Cost ($/yr)	($/ft²)	Percent of Total (%)
HVAC Components			
Electric	40,061	0.335	35.4
Natural Gas	12,200	0.102	10.8
Fuel Oil	0	0.000	0.0
Propane	0	0.000	0.0
Remote Hot Water	0	0.000	0.0
Remote Steam	0	0.000	0.0
Remote Chilled Water	0	0.000	0.0
HVAC Sub-Total	**52,262**	**0.437**	**46.2**
Non-HVAC Components			
Electric	60,878	0.508	53.8
Natural Gas	0	0.000	0.0
Fuel Oil	0	0.000	0.0
Propane	0	0.000	0.0
Remote Hot Water	0	0.000	0.0
Remote Steam	0	0.000	0.0
Non-HVAC Sub-Total	**60,878**	**0.508**	**53.8**
Grand Total	**113,140**	**0.945**	**100.0**

Note: Cost per unit floor area is based on the gross building floor area.

Gross Floor Area ..... **119741.0** ft²
Conditioned Floor Area **119741.0** ft²

Annual HVAC & Non-HVAC Cost Totals - PROPOSED EXISTING

17-024 JONAS COURTHOUSE - PRELIMINARY 09/22/2017
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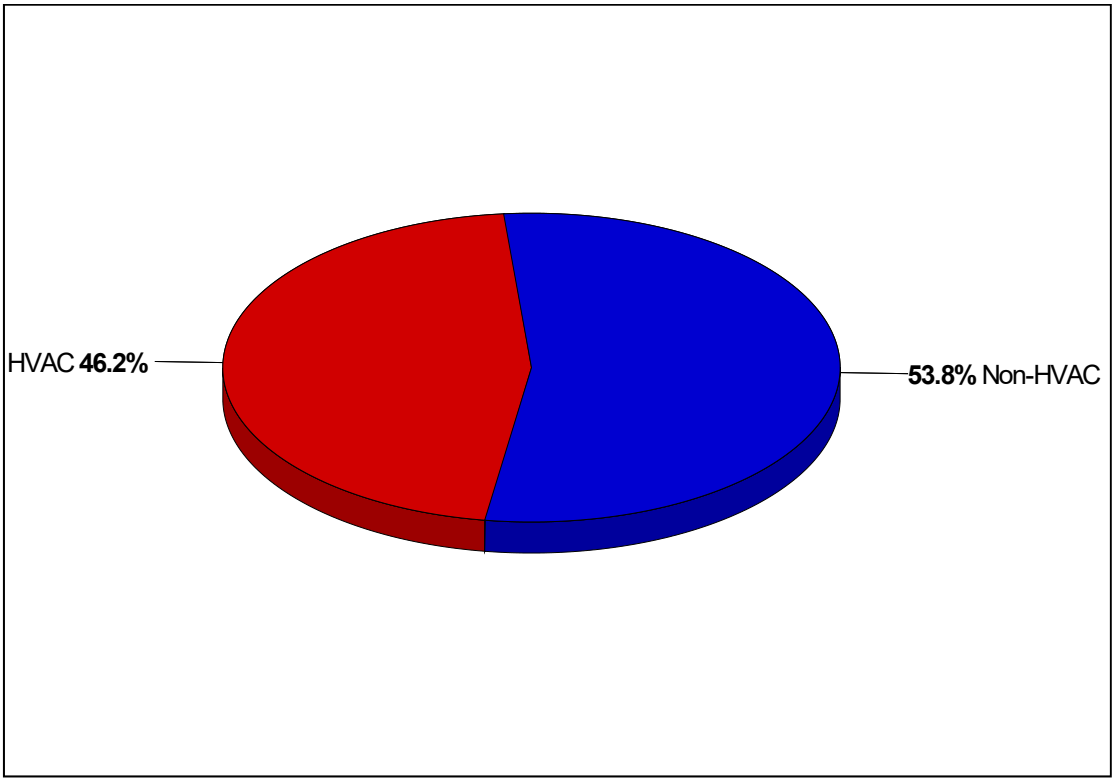

1. Annual Costs

Component	Annual Cost ($/yr)	($/ft²)	Percent of Total (%)
HVAC	52,260	0.436	46.2
Non-HVAC	60,879	0.508	53.8
Grand Total	**113,139**	**0.945**	**100.0**

Note: Cost per unit floor area is based on the gross building floor area.

Gross Floor Area ..... **119741.0** ft²
Conditioned Floor Area **119741.0** ft²

1. Annual Coil Loads

Component	Load (kBTU)	(kBTU/ft²)
Cooling Coil Loads	4,590,106	38.334
Heating Coil Loads	1,219,911	10.188
Grand Total	**5,810,017**	**48.522**

2. Energy Consumption by System Component

Component	Site Energy (kBTU)	Site Energy (kBTU/ft²)	Source Energy (kBTU)	Source Energy (kBTU/ft²)
Air System Fans	911,308	7.611	3,254,672	27.181
Cooling	292,751	2.445	1,045,539	8.732
Heating	1,049,032	8.761	1,049,032	8.761
Pumps	361,039	3.015	1,289,425	10.769
Heat Rejection Fans	167,276	1.397	597,413	4.989
HVAC Sub-Total	**2,781,406**	**23.229**	**7,236,082**	**60.431**
Lights	921,959	7.700	3,292,710	27.499
Electric Equipment	1,710,712	14.287	6,109,686	51.024
Misc. Electric	0	0.000	0	0.000
Misc. Fuel Use	0	0.000	0	0.000
Non-HVAC Sub-Total	**2,632,671**	**21.986**	**9,402,396**	**78.523**
Grand Total	**5,414,077**	**45.215**	**16,638,478**	**138.954**

Notes:
1. 'Cooling Coil Loads' is the sum of all air system cooling coil loads.
2. 'Heating Coil Loads' is the sum of all air system heating coil loads.
3. Site Energy is the actual energy consumed.
4. Source Energy is the site energy divided by the electric generating efficiency (28.0%).
5. Source Energy for fuels equals the site energy value.
6. Energy per unit floor area is based on the gross building floor area.
   Gross Floor Area ..... **119741.0** ft²
   Conditioned Floor Area ..... **119741.0** ft²

Energy Budget by Energy Source - PROPOSED EXISTING

17-024 JONAS COURTHOUSE - PRELIMINARY 09/22/2017
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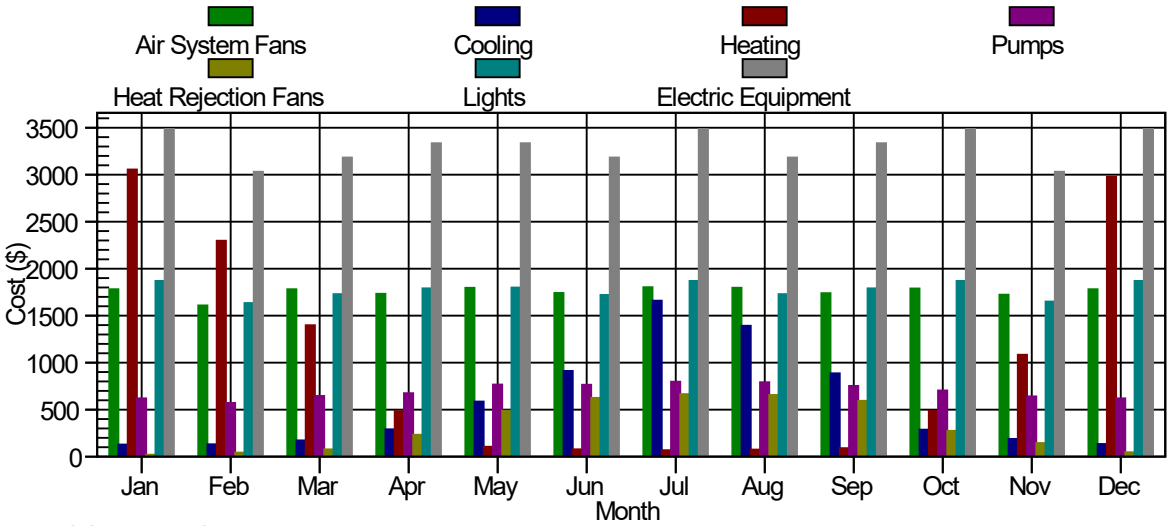
1. Annual Coil Loads

Component	Load (kBTU)	(kBTU/ft²)
Cooling Coil Loads	4,590,106	38.334
Heating Coil Loads	1,219,911	10.188
Grand Total	**5,810,017**	**48.522**

2. Energy Consumption by Energy Source

Component	Site Energy (kBTU)	Site Energy (kBTU/ft²)	Source Energy (kBTU)	Source Energy (kBTU/ft²)
HVAC Components				
Electric	1,732,440	14.468	6,187,286	51.672
Natural Gas	1,049,032	8.761	1,049,032	8.761
Fuel Oil	0	0.000	0	0.000
Propane	0	0.000	0	0.000
Remote Hot Water	0	0.000	0	0.000
Remote Steam	0	0.000	0	0.000
Remote Chilled Water	0	0.000	0	0.000
HVAC Sub-Total	**2,781,472**	**23.229**	**7,236,318**	**60.433**
Non-HVAC Components				
Electric	2,632,665	21.986	9,402,374	78.523
Natural Gas	0	0.000	0	0.000
Fuel Oil	0	0.000	0	0.000
Propane	0	0.000	0	0.000
Remote Hot Water	0	0.000	0	0.000
Remote Steam	0	0.000	0	0.000
Non-HVAC Sub-Total	**2,632,665**	**21.986**	**9,402,374**	**78.523**
Grand Total	**5,414,137**	**45.215**	**16,638,692**	**138.956**

Notes:
1. 'Cooling Coil Loads' is the sum of all air system cooling coil loads.
2. 'Heating Coil Loads' is the sum of all air system heating coil loads.
3. Site Energy is the actual energy consumed.
4. Source Energy is the site energy divided by the electric generating efficiency (28.0%).
5. Source Energy for fuels equals the site energy value.
6. Energy per unit floor area is based on the gross building floor area.
   Gross Floor Area ..... **119741.0** ft²
   Conditioned Floor Area ..... **119741.0** ft²



1. HVAC Component Costs

Month	Air System Fans ($)	Cooling ($)	Heating ($)	Pumps ($)	Heat Rejection Fans ($)	HVAC Total ($)
January	1,781	129	3,055	620	21	5,606
February	1,609	131	2,298	571	43	4,652
March	1,781	172	1,398	645	77	4,073
April	1,733	291	484	675	233	3,416
May	1,796	586	105	767	489	3,743
June	1,741	912	78	765	625	4,121
July	1,803	1,659	68	798	665	4,993
August	1,797	1,392	75	791	656	4,711
September	1,739	887	90	753	594	4,063
October	1,789	287	487	704	275	3,542
November	1,723	189	1,084	641	145	3,782
December	1,781	134	2,979	620	46	5,560
Total	**21,073**	**6,770**	**12,200**	**8,349**	**3,868**	**52,260**

2. Non-HVAC Component Costs

Month	Lights ($)	Electric Equipment ($)	Misc. Electric ($)	Misc. Fuel Use ($)	Non-HVAC Total ($)	Grand Total ($)
January	1,869	3,486	0	0	5,355	10,961
February	1,634	3,031	0	0	4,665	9,317
March	1,729	3,183	0	0	4,912	8,985
April	1,791	3,334	0	0	5,125	8,541
May	1,799	3,334	0	0	5,133	8,876
June	1,721	3,183	0	0	4,903	9,024
July	1,869	3,486	0	0	5,355	10,348
August	1,729	3,183	0	0	4,912	9,623
September	1,791	3,334	0	0	5,125	9,188
October	1,869	3,486	0	0	5,355	8,897
November	1,650	3,031	0	0	4,682	8,464
December	1,869	3,486	0	0	5,355	10,915
Total	**21,320**	**39,559**	**0**	**0**	**60,879**	**113,139**

Monthly Energy Costs - PROPOSED EXISTING

17-024 JONAS COURTHOUSE - PRELIMINARY 09/22/2017
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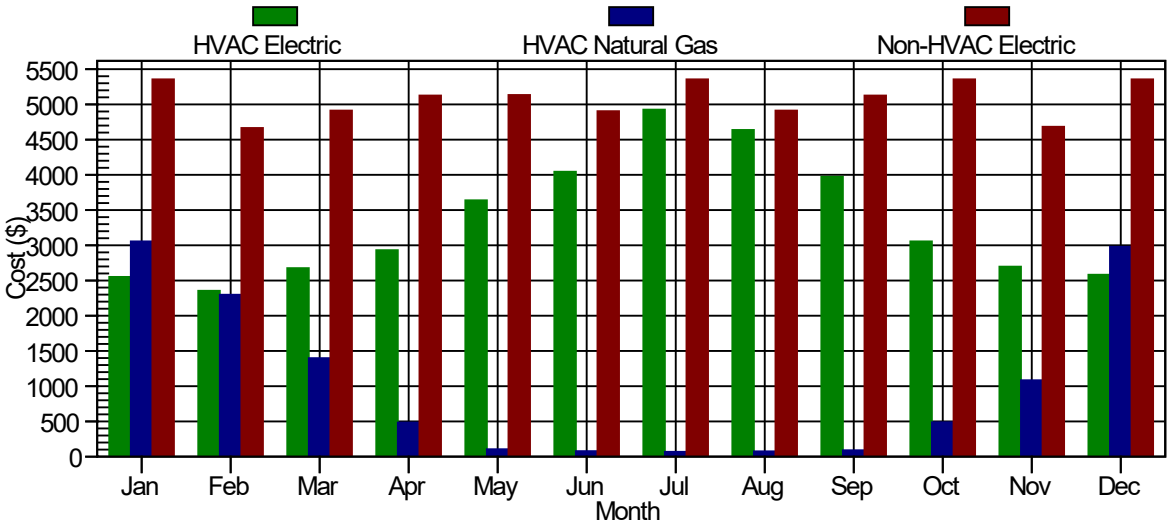

1. HVAC Costs

Month	Electric ($)	Natural Gas ($)	Fuel Oil ($)	Propane ($)	Remote Hot Water ($)	Remote Steam ($)	Remote Chilled Water ($)
January	2,551	3,055	0	0	0	0	0
February	2,354	2,298	0	0	0	0	0
March	2,676	1,398	0	0	0	0	0
April	2,931	484	0	0	0	0	0
May	3,638	105	0	0	0	0	0
June	4,043	78	0	0	0	0	0
July	4,926	68	0	0	0	0	0
August	4,637	75	0	0	0	0	0
September	3,972	90	0	0	0	0	0
October	3,055	487	0	0	0	0	0
November	2,697	1,084	0	0	0	0	0
December	2,582	2,979	0	0	0	0	0
Total	**40,061**	**12,200**	**0**	**0**	**0**	**0**	**0**

2. Non-HVAC Costs

Month	Electric ($)	Natural Gas ($)	Fuel Oil ($)	Propane ($)	Remote Hot Water ($)	Remote Steam ($)
January	5,355	0	0	0	0	0
February	4,665	0	0	0	0	0
March	4,912	0	0	0	0	0
April	5,125	0	0	0	0	0
May	5,133	0	0	0	0	0
June	4,903	0	0	0	0	0
July	5,355	0	0	0	0	0
August	4,912	0	0	0	0	0
September	5,125	0	0	0	0	0
October	5,355	0	0	0	0	0
November	4,682	0	0	0	0	0
December	5,355	0	0	0	0	0
Total	**60,878**	**0**	**0**	**0**	**0**	**0**

Monthly Energy Use by Component - PROPOSED EXISTING

1. Monthly Energy Use by System Component

Component	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Air System Fans (kWh)	22573	20390	22572	21960	22765	22067	22852	22773	22040	22680	21840	22577
Cooling												
Electric (kWh)	1633	1665	2184	3682	7431	11558	21033	17646	11237	3642	2390	1700
Natural Gas (Therm)	0	0	0	0	0	0	0	0	0	0	0	0
Fuel Oil (na)	0	0	0	0	0	0	0	0	0	0	0	0
Propane (na)	0	0	0	0	0	0	0	0	0	0	0	0
Remote HW (na)	0	0	0	0	0	0	0	0	0	0	0	0
Remote Steam (na)	0	0	0	0	0	0	0	0	0	0	0	0
Remote CW (na)	0	0	0	0	0	0	0	0	0	0	0	0
Heating												
Electric (kWh)	0	0	0	0	0	0	0	0	0	0	0	0
Natural Gas (Therm)	2627	1976	1202	416	91	67	59	64	77	419	932	2561
Fuel Oil (na)	0	0	0	0	0	0	0	0	0	0	0	0
Propane (na)	0	0	0	0	0	0	0	0	0	0	0	0
Remote HW (na)	0	0	0	0	0	0	0	0	0	0	0	0
Remote Steam (na)	0	0	0	0	0	0	0	0	0	0	0	0
Pumps (kWh)	7857	7240	8176	8553	9718	9695	10109	10030	9540	8919	8120	7856
Heat Rej. Fans (kWh)	264	545	981	2951	6192	7924	8430	8314	7525	3480	1832	588
Lighting (kWh)	23690	20709	21912	22696	22801	21807	23690	21912	22696	23690	20918	23690
Electric Eqpt. (kWh)	44183	38420	40341	42262	42262	40341	44183	40341	42262	44183	38420	44183
Misc. Electric (kWh)	0	0	0	0	0	0	0	0	0	0	0	0
Misc. Fuel												
Natural Gas (Therm)	0	0	0	0	0	0	0	0	0	0	0	0
Propane (na)	0	0	0	0	0	0	0	0	0	0	0	0
Remote HW (na)	0	0	0	0	0	0	0	0	0	0	0	0
Remote Steam (na)	0	0	0	0	0	0	0	0	0	0	0	0

Monthly Energy Use by Energy Type - PROPOSED EXISTING

17-024 JONAS COURTHOUSE - PRELIMINARY 09/22/2017
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1. HVAC Energy Use

Month	Electric (kWh)	Natural Gas (Therm)	Fuel Oil (na)	Propane (na)	Remote HW (na)	Remote Steam (na)	Remote CW (na)
Jan	32,326	2,627	0	0	0	0	0
Feb	29,839	1,976	0	0	0	0	0
Mar	33,913	1,202	0	0	0	0	0
Apr	37,146	416	0	0	0	0	0
May	46,108	91	0	0	0	0	0
Jun	51,248	67	0	0	0	0	0
Jul	62,430	59	0	0	0	0	0
Aug	58,770	64	0	0	0	0	0
Sep	50,345	77	0	0	0	0	0
Oct	38,721	419	0	0	0	0	0
Nov	34,182	932	0	0	0	0	0
Dec	32,721	2,561	0	0	0	0	0
Totals	507,749	10,490	0	0	0	0	0

2. Non-HVAC Energy Use

Month	Electric (kWh)	Natural Gas (Therm)	Fuel Oil (na)	Propane (na)	Remote HW (na)	Remote Steam (na)
Jan	67,873	0	0	0	0	0
Feb	59,129	0	0	0	0	0
Mar	62,253	0	0	0	0	0
Apr	64,958	0	0	0	0	0
May	65,063	0	0	0	0	0
Jun	62,148	0	0	0	0	0
Jul	67,873	0	0	0	0	0
Aug	62,253	0	0	0	0	0
Sep	64,958	0	0	0	0	0
Oct	67,873	0	0	0	0	0
Nov	59,338	0	0	0	0	0
Dec	67,873	0	0	0	0	0
Totals	771,590	0	0	0	0	0

1. REPORT AND PROJECT INFORMATION

General

Simulation Program Name and Version ..... **Hourly Analysis Program 5.10**
Simulation Weather File Name ..... **Charlotte, North Carolina (TM2)**

Building Designations

Proposed Building ..... **PROPOSED EXISTING**
Baseline - 0° ..... **[B000] BASELINE EXISTING**
Baseline - 90° ..... **n/a**
Baseline - 180° ..... **n/a**
Baseline - 270° ..... **n/a**

Space Summary

	Proposed Design	Baseline
Conditioned Floor Area (ft²)	119,741	118,061
Unconditioned Floor Area (ft²)	0	0
Total Floor Area (ft²)	119,741	118,061

2. MINIMUM ENERGY PERFORMANCE CALCULATOR

SHADING AND FENESTRATION

Building Massing and Zoning

Above-Grade Wall & Vertical Glazing Areas

Orientation	Baseline Design (0° rotation)			Proposed Design		
	Gross Above-Grade Wall Area	Vertical Glazing Area		Gross Above-Grade Wall Area	Vertical Glazing Area	
	(ft²)	(ft²)	(% WWR)	(ft²)	(ft²)	(% WWR)
North	0	0	0.0	0	0	0.0
North-Northeast	0	0	0.0	0	0	0.0
Northeast	8,832	2,460	27.9	8,832	2,460	27.9
East-Northeast	0	0	0.0	0	0	0.0
East	0	0	0.0	0	0	0.0
East-Southeast	0	0	0.0	0	0	0.0
Southeast	3,664	780	21.3	3,664	780	21.3
South-Southeast	0	0	0.0	0	0	0.0
South	0	0	0.0	0	0	0.0
South-Southwest	0	0	0.0	0	0	0.0
Southwest	1,728	120	6.9	1,728	120	6.9
West-Southwest	0	0	0.0	0	0	0.0
West	0	0	0.0	0	0	0.0
West-Northwest	0	0	0.0	0	0	0.0
Northwest	5,904	1,320	22.4	8,144	1,760	21.6
North-Northwest	0	0	0.0	0	0	0.0
Total	**20,128**	**4,680**	**23.3**	**22,368**	**5,120**	**22.9**

Roof & Skylight Areas

Baseline Design (0° rotation)			Proposed Design		
Gross Roof Area	Skylight Area		Gross Roof Area	Skylight Area	
(ft²)	(ft²)	(%)	(ft²)	(ft²)	(%)
40,193	0	0.0	40,193	0	0.0

Note: In these tables, roof and skylight surfaces with slope of 60° or more (from horizontal) are treated as walls and vertical glazing, as according to

LEED v4 EA Credit Optimize Energy Performance Summary Report

17-024 JONAS COURTHOUSE - PRELIMINARY 09/22/2017
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ASHRAE 90.1 Section 3.

PERFORMANCE OUTPUTS

Energy Sources

Energy Type	Energy Consumption Units	Demand Units	Utility Rate Name	Utility Rate Structure
Electric	kWh	kW	Sample Electric Rate	
Natural Gas	Therm	MBH	Sample Fuel Rate	

Performance Rating Method Compliance

Baseline Energy Summary by End Use

End Use	Unregulated ?	Baseline Design Energy Type	Units of Annual Energy & Peak Demand	Baseline (0° rotation)	Baseline (90° rotation)	Baseline (180° rotation)	Baseline (270° rotation)	Baseline Design Total (Average of 4 Rotations)
Interior Lighting		Electric	Consumption [kWh]	332,861.9	0.0	0.0	0.0	332,861.9
			Demand [kW]	118.1	0.0	0.0	0.0	118.1
Space Heating		Natural Gas	Consumption [Therm]	8,733.0	0.0	0.0	0.0	8,733.0
			Demand [MBH]	3,236.9	0.0	0.0	0.0	3,236.9
Space Cooling		Electric	Consumption [kWh]	233,601.2	0.0	0.0	0.0	233,601.2
			Demand [kW]	229.0	0.0	0.0	0.0	229.0
Pumps		Electric	Consumption [kWh]	220,601.5	0.0	0.0	0.0	220,601.5
			Demand [kW]	56.8	0.0	0.0	0.0	56.8
Heat Rejection		Electric	Consumption [kWh]	48,854.2	0.0	0.0	0.0	48,854.2
			Demand [kW]	26.2	0.0	0.0	0.0	26.2
Fans - Interior		Electric	Consumption [kWh]	192,753.6	0.0	0.0	0.0	192,753.6
			Demand [kW]	76.4	0.0	0.0	0.0	76.4
Receptacle Equipment	X	Electric	Consumption [kWh]	494,856.0	0.0	0.0	0.0	494,856.0
			Demand [kW]	192.8	0.0	0.0	0.0	192.8
Total energy consumption by energy type		Electric	kWh	1,523,528.3	0.0	0.0	0.0	1,523,528.3
		Natural Gas	Therm	8,733.0	0.0	0.0	0.0	8,733.0

(1) This form determines compliance using cost calculations from Section 1.9. Process Energy Costs should be modeled to accurately reflect the proposed building. Process Energy must be the same in the baseline and proposed cases, unless an exceptional calculation is used. Process energy costs must be at least 25% of the total baseline energy costs. Any exceptions must be supported by a narrative and/or other supporting documentation.
(2) In this project Process Energy is 30.0% of total baseline energy cost.

Baseline Building Annual Energy Cost by Energy Type

Energy Type		Baseline (0° rotation) ($)	Baseline (90° rotation) ($)	Baseline (180° rotation) ($)	Baseline (270° rotation) ($)	Baseline Design Total ($)
Electric	kWh	120,206	0	0	0	120,206
Natural Gas	Therm	10,157	0	0	0	10,157
Baseline Annual Energy Cost		**130,363**	**0**	**0**	**0**	**130,363**

Proposed Energy Summary by End Use

End Use	Unregulated ?	Energy Type	Units of Annual Energy and Peak Demand	Baseline	Proposed	Energy / Demand Savings per End Use	End Use Percent Contribution to Total Energy Savings	End Use Percent Contribution to Total Cost Savings	Percent of Total Proposed Site Energy Consumption
Interior Lighting		Electric	Consumption [kWh]	332,862	270,211	18.8 %	32.5 %	28.7 %	17.0 %
			Demand [kW]	118.1	95.8	18.9 %			
Space Heating		Natural Gas	Consumption [Therm]	8,733	10,490	-20.1 %	-0.9 %	-11.9 %	0.7 %
			Demand [MBH]	3,236.9	1,087.0	66.4 %			
Space Cooling		Electric	Consumption [kWh]	233,601	85,800	63.3 %	76.7 %	67.7 %	5.4 %
			Demand [kW]	229.0	119.7	47.7 %			
Pumps		Electric	Consumption [kWh]	220,601	105,815	52.0 %	59.6 %	52.6 %	6.7 %
			Demand [kW]	56.8	14.8	73.9 %			
Heat Rejection		Electric	Consumption [kWh]	48,854	49,025	-0.4 %	-0.1 %	-0.1 %	3.1 %
			Demand [kW]	26.2	12.5	52.0 %			
Fans - Interior		Electric	Consumption [kWh]	192,754	267,092	-38.6 %	-38.6 %	-34.1 %	16.8 %
			Demand [kW]	76.4	33.1	56.7 %			
Receptacle Equipment	X	Electric	Consumption [kWh]	494,856	501,381	-1.3 %	-3.4 %	-3.0 %	31.6 %
			Demand [kW]	192.8	195.3	-1.3 %			

Performance Rating Energy Consumption and Cost by Fuel Type - Performance Rating Method Compliance

Energy Type	Site Energy Units	Baseline		Proposed		Percent Savings	
		Site Energy Use (Units shown per energy type)	Cost($)	Site Energy Use (Units shown per energy type)	Cost ($)	Site Energy Use	Cost
Electric	kWh	1,523,528.3	120,206	1,279,324.6	100,939	16.0%	16.0%
Natural Gas	Therm	8,733.0	10,157	10,490.3	12,200	-20.1%	-20.1%
Energy Model Subtotal	**kWh**	**1,779,479.0**	**130,363**	**1,586,778.5**	**113,139**	**10.8%**	**13.2%**

Unmet Loads

Unmet Loads	Baseline Building (0° rotation)	Proposed Building	Difference
Number of hours heating loads not met	2	478	-476
Number of hours cooling loads not met	1	183	-182
Totals	3	661	-658
Compliance	No		

3. EA CREDIT POINTS REFERENCE TABLE

No points table is available for LEED v4 using ASHRAE Std 90.1-2013.

Annual Cost Summary

17-024 JONAS COURTHOUSE - PRELIMINARY 09/22/2017
MSWG 07:29AM

Table 1. Annual Costs

Component	[B000] BASELINE ANNEX ($)	PROPOSED ANNEX ($)
Air System Fans	18,173	10,265
Cooling	22,303	5,476
Heating	6,744	9,906
Pumps	19,979	11,951
Heat Rejection Fans	4,478	6,012
HVAC Sub-Total	**71,677**	**43,610**
Lights	30,905	25,319
Electric Equipment	47,096	46,324
Misc. Electric	0	0
Misc. Fuel Use	0	0
Non-HVAC Sub-Total	**78,001**	**71,643**
Grand Total	**149,678**	**115,252**

Table 2. Annual Cost per Unit Floor Area

Component	[B000] BASELINE ANNEX ($/ft²)	PROPOSED ANNEX ($/ft²)
Air System Fans	0.121	0.069
Cooling	0.149	0.037
Heating	0.045	0.067
Pumps	0.133	0.080
Heat Rejection Fans	0.030	0.040
HVAC Sub-Total	**0.478**	**0.293**
Lights	0.206	0.170
Electric Equipment	0.314	0.312
Misc. Electric	0.000	0.000
Misc. Fuel Use	0.000	0.000
Non-HVAC Sub-Total	**0.520**	**0.482**
Grand Total	**0.998**	**0.775**
Gross Floor Area (ft²)	150027.0	148648.0
Conditioned Floor Area (ft²)	150027.0	148648.0

Note: Values in this table are calculated using the Gross Floor Area.

Table 3. Component Cost as a Percentage of Total Cost

Component	[B000] BASELINE ANNEX (%)	PROPOSED ANNEX (%)
Air System Fans	12.1	8.9
Cooling	14.9	4.8
Heating	4.5	8.6
Pumps	13.3	10.4
Heat Rejection Fans	3.0	5.2
HVAC Sub-Total	**47.9**	**37.8**
Lights	20.6	22.0
Electric Equipment	31.5	40.2
Misc. Electric	0.0	0.0
Misc. Fuel Use	0.0	0.0
Non-HVAC Sub-Total	**52.1**	**62.2**
Grand Total	**100.0**	**100.0**

Annual Energy and Emissions Summary

17-024 JONAS COURTHOUSE - PRELIMINARY 09/22/2017
MSWG 07:29AM

Table 1. Annual Costs

Component	[B000] BASELINE ANNEX ($)	PROPOSED ANNEX ($)
HVAC Components		
Electric	64,934	33,704
Natural Gas	6,744	9,906
Fuel Oil	0	0
Propane	0	0
Remote HW	0	0
Remote Steam	0	0
Remote CW	0	0
HVAC Sub-Total	**71,678**	**43,610**
Non-HVAC Components		
Electric	78,000	71,644
Natural Gas	0	0
Fuel Oil	0	0
Propane	0	0
Remote HW	0	0
Remote Steam	0	0
Non-HVAC Sub-Total	**78,000**	**71,644**
Grand Total	**149,678**	**115,253**

Table 2. Annual Energy Consumption

Component	[B000] BASELINE ANNEX	PROPOSED ANNEX
HVAC Components		
Electric (kWh)	822,986	427,177
Natural Gas (Therm)	5,799	8,517
Fuel Oil (na)	0	0
Propane (na)	0	0
Remote HW (na)	0	0
Remote Steam (na)	0	0
Remote CW (na)	0	0
Non-HVAC Components		
Electric (kWh)	988,594	908,031
Natural Gas (Therm)	0	0
Fuel Oil (na)	0	0
Propane (na)	0	0
Remote HW (na)	0	0
Remote Steam (na)	0	0
Totals		
Electric (kWh)	1,811,580	1,335,208
Natural Gas (Therm)	5,799	8,517
Fuel Oil (na)	0	0
Propane (na)	0	0
Remote HW (na)	0	0
Remote Steam (na)	0	0
Remote CW (na)	0	0

Table 3. Annual Emissions

Component	[B000] BASELINE ANNEX	PROPOSED ANNEX
CO2 Equivalent (lb)	0	0

Annual Energy and Emissions Summary

17-024 JONAS COURTHOUSE - PRELIMINARY 09/22/2017
MSWG 07:29AM

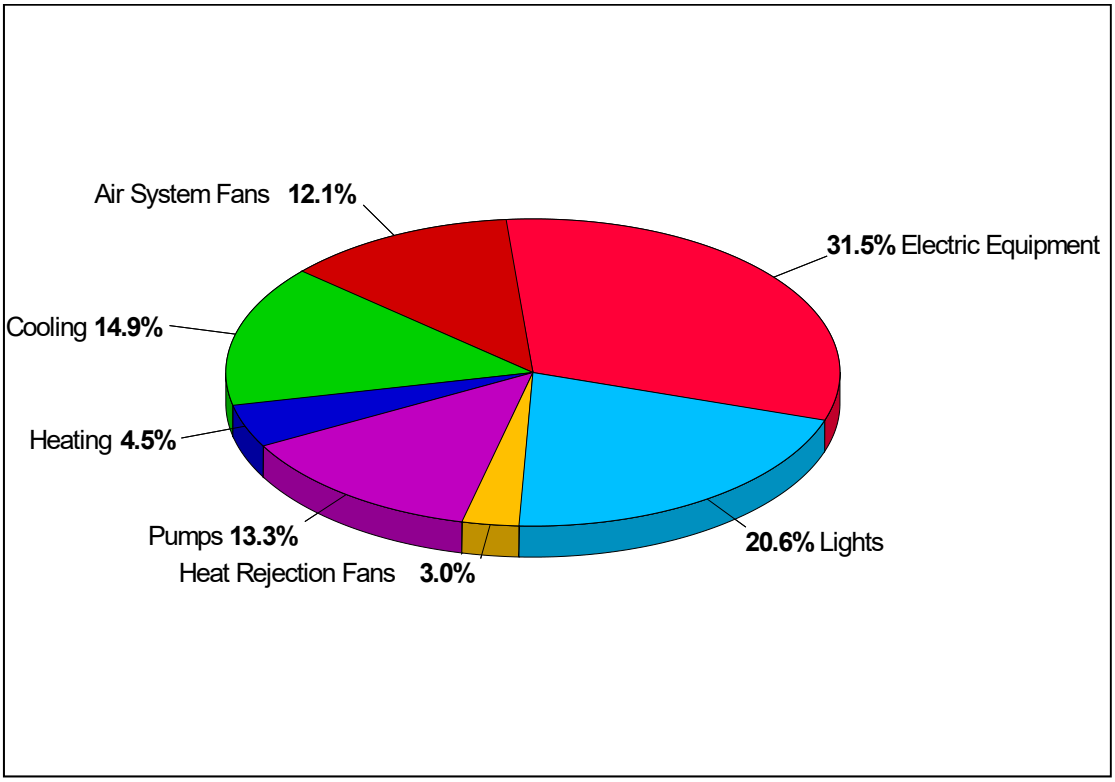
Table 4. Annual Cost per Unit Floor Area

Component	[B000] BASELINE ANNEX ($/ft²)	PROPOSED ANNEX ($/ft²)
HVAC Components		
Electric	0.433	0.227
Natural Gas	0.045	0.067
Fuel Oil	0.000	0.000
Propane	0.000	0.000
Remote HW	0.000	0.000
Remote Steam	0.000	0.000
Remote CW	0.000	0.000
HVAC Sub-Total	**0.478**	**0.293**
Non-HVAC Components		
Electric	0.520	0.482
Natural Gas	0.000	0.000
Fuel Oil	0.000	0.000
Propane	0.000	0.000
Remote HW	0.000	0.000
Remote Steam	0.000	0.000
Non-HVAC Sub-Total	**0.520**	**0.482**
Grand Total	**0.998**	**0.775**
Gross Floor Area (ft²)	150027.0	148648.0
Conditioned Floor Area (ft²)	150027.0	148648.0

Note: Values in this table are calculated using the Gross Floor Area.

Table 5. Component Cost as a Percentage of Total Cost

Component	[B000] BASELINE ANNEX (%)	PROPOSED ANNEX (%)
HVAC Components		
Electric	43.4	29.2
Natural Gas	4.5	8.6
Fuel Oil	0.0	0.0
Propane	0.0	0.0
Remote HW	0.0	0.0
Remote Steam	0.0	0.0
Remote CW	0.0	0.0
HVAC Sub-Total	**47.9**	**37.8**
Non-HVAC Components		
Electric	52.1	62.2
Natural Gas	0.0	0.0
Fuel Oil	0.0	0.0
Propane	0.0	0.0
Remote HW	0.0	0.0
Remote Steam	0.0	0.0
Non-HVAC Sub-Total	**52.1**	**62.2**
Grand Total	**100.0**	**100.0**



1. Annual Costs

Component	Annual Cost ($)	($/ft²)	Percent of Total (%)
Air System Fans	18,173	0.121	12.1
Cooling	22,303	0.149	14.9
Heating	6,744	0.045	4.5
Pumps	19,979	0.133	13.3
Heat Rejection Fans	4,478	0.030	3.0
HVAC Sub-Total	**71,677**	**0.478**	**47.9**
Lights	30,905	0.206	20.6
Electric Equipment	47,096	0.314	31.5
Misc. Electric	0	0.000	0.0
Misc. Fuel Use	0	0.000	0.0
Non-HVAC Sub-Total	**78,001**	**0.520**	**52.1**
Grand Total	**149,678**	**0.998**	**100.0**

Note: Cost per unit floor area is based on the gross building floor area.

Gross Floor Area ..... **150027.0** ft²
Conditioned Floor Area **150027.0** ft²

Annual Energy Costs - [B000] BASELINE ANNEX

17-024 JONAS COURTHOUSE - PRELIMINARY 09/22/2017
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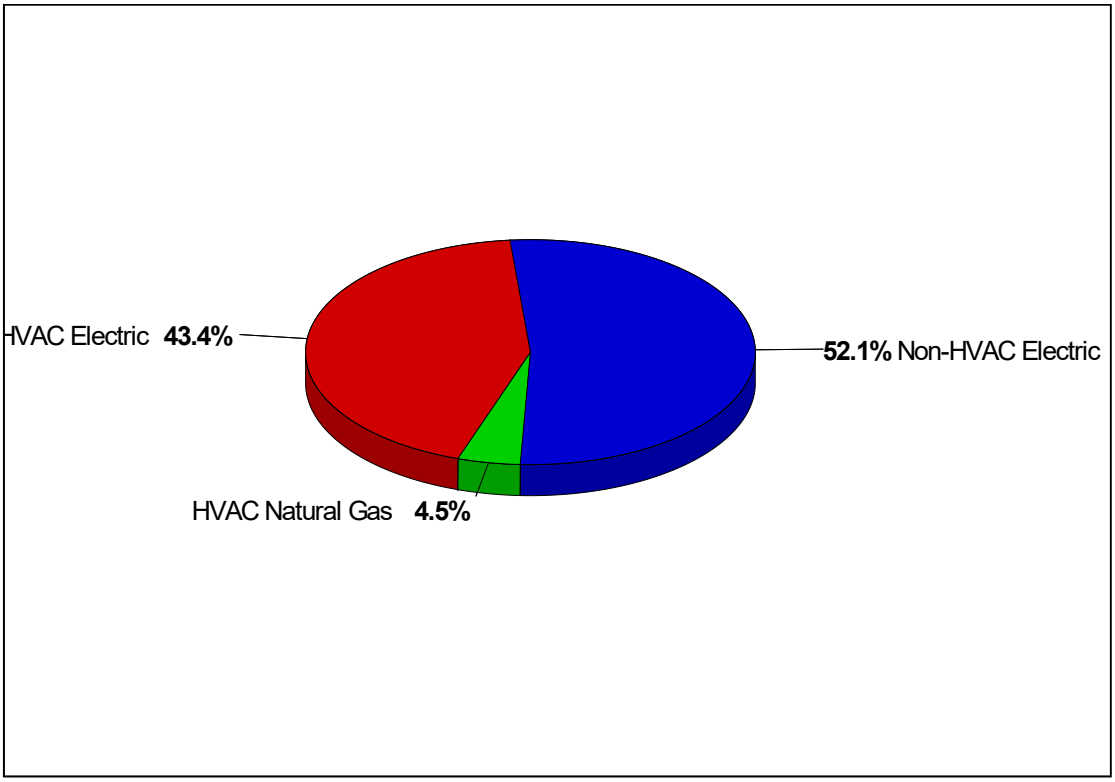
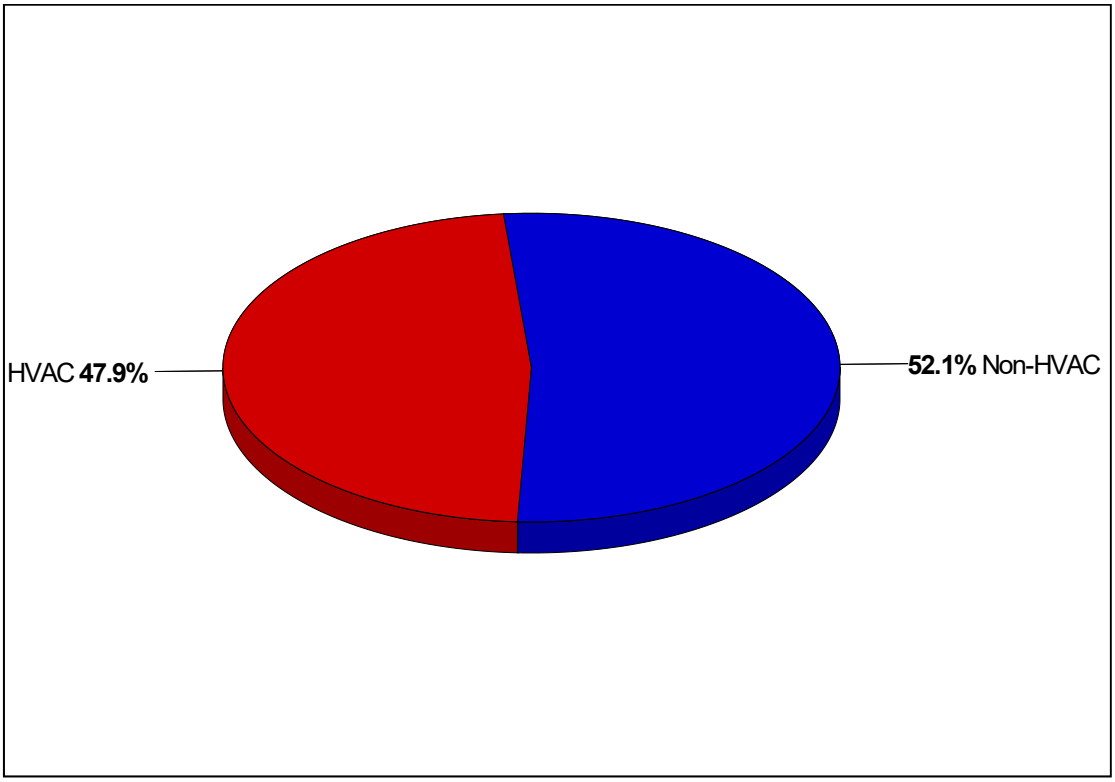


1. Annual Costs

Component	Annual Cost ($/yr)	($/ft²)	Percent of Total (%)
HVAC Components			
Electric	64,934	0.433	43.4
Natural Gas	6,744	0.045	4.5
Fuel Oil	0	0.000	0.0
Propane	0	0.000	0.0
Remote Hot Water	0	0.000	0.0
Remote Steam	0	0.000	0.0
Remote Chilled Water	0	0.000	0.0
HVAC Sub-Total	**71,678**	**0.478**	**47.9**
Non-HVAC Components			
Electric	78,000	0.520	52.1
Natural Gas	0	0.000	0.0
Fuel Oil	0	0.000	0.0
Propane	0	0.000	0.0
Remote Hot Water	0	0.000	0.0
Remote Steam	0	0.000	0.0
Non-HVAC Sub-Total	**78,000**	**0.520**	**52.1**
Grand Total	**149,678**	**0.998**	**100.0**

Note: Cost per unit floor area is based on the gross building floor area.

Gross Floor Area ..... **150027.0** ft²
Conditioned Floor Area **150027.0** ft²



1. Annual Costs

Component	Annual Cost ($/yr)	($/ft²)	Percent of Total (%)
HVAC	71,677	0.478	47.9
Non-HVAC	78,001	0.520	52.1
Grand Total	**149,678**	**0.998**	**100.0**

Note: Cost per unit floor area is based on the gross building floor area.

Gross Floor Area ..... **150027.0** ft²
Conditioned Floor Area **150027.0** ft²

Energy Budget by System Component - [B000] BASELINE ANNEX

17-024 JONAS COURTHOUSE - PRELIMINARY 09/22/2017
MSWG 07:29AM

1. Annual Coil Loads

Component	Load (kBTU)	(kBTU/ft²)
Cooling Coil Loads	5,922,357	39.475
Heating Coil Loads	479,764	3.198
Grand Total	**6,402,121**	**42.673**

2. Energy Consumption by System Component

Component	Site Energy (kBTU)	Site Energy (kBTU/ft²)	Source Energy (kBTU)	Source Energy (kBTU/ft²)
Air System Fans	785,875	5.238	2,806,696	18.708
Cooling	964,488	6.429	3,444,600	22.960
Heating	579,870	3.865	579,870	3.865
Pumps	863,978	5.759	3,085,637	20.567
Heat Rejection Fans	193,657	1.291	691,631	4.610
HVAC Sub-Total	**3,387,868**	**22.582**	**10,608,434**	**70.710**
Lights	1,336,470	8.908	4,773,108	31.815
Electric Equipment	2,036,647	13.575	7,273,738	48.483
Misc. Electric	0	0.000	0	0.000
Misc. Fuel Use	0	0.000	0	0.000
Non-HVAC Sub-Total	**3,373,117**	**22.483**	**12,046,846**	**80.298**
Grand Total	**6,760,985**	**45.065**	**22,655,279**	**151.008**

Notes:
1. 'Cooling Coil Loads' is the sum of all air system cooling coil loads.
2. 'Heating Coil Loads' is the sum of all air system heating coil loads.
3. Site Energy is the actual energy consumed.
4. Source Energy is the site energy divided by the electric generating efficiency (28.0%).
5. Source Energy for fuels equals the site energy value.
6. Energy per unit floor area is based on the gross building floor area.
   Gross Floor Area ..... **150027.0** ft²
   Conditioned Floor Area ..... **150027.0** ft²

1. Annual Coil Loads

Component	Load (kBTU)	(kBTU/ft²)
Cooling Coil Loads	5,922,357	39.475
Heating Coil Loads	479,764	3.198
Grand Total	**6,402,121**	**42.673**

2. Energy Consumption by Energy Source

Component	Site Energy (kBTU)	Site Energy (kBTU/ft²)	Source Energy (kBTU)	Source Energy (kBTU/ft²)
HVAC Components				
Electric	2,808,029	18.717	10,028,677	66.846
Natural Gas	579,870	3.865	579,870	3.865
Fuel Oil	0	0.000	0	0.000
Propane	0	0.000	0	0.000
Remote Hot Water	0	0.000	0	0.000
Remote Steam	0	0.000	0	0.000
Remote Chilled Water	0	0.000	0	0.000
HVAC Sub-Total	**3,387,899**	**22.582**	**10,608,547**	**70.711**
Non-HVAC Components				
Electric	3,373,082	22.483	12,046,722	80.297
Natural Gas	0	0.000	0	0.000
Fuel Oil	0	0.000	0	0.000
Propane	0	0.000	0	0.000
Remote Hot Water	0	0.000	0	0.000
Remote Steam	0	0.000	0	0.000
Non-HVAC Sub-Total	**3,373,082**	**22.483**	**12,046,722**	**80.297**
Grand Total	**6,760,981**	**45.065**	**22,655,269**	**151.008**

Notes:
1. 'Cooling Coil Loads' is the sum of all air system cooling coil loads.
2. 'Heating Coil Loads' is the sum of all air system heating coil loads.
3. Site Energy is the actual energy consumed.
4. Source Energy is the site energy divided by the electric generating efficiency (28.0%).
5. Source Energy for fuels equals the site energy value.
6. Energy per unit floor area is based on the gross building floor area.
   Gross Floor Area ..... **150027.0** ft²
   Conditioned Floor Area ..... **150027.0** ft²

Monthly Component Costs - [B000] BASELINE ANNEX

17-024 JONAS COURTHOUSE - PRELIMINARY 09/22/2017
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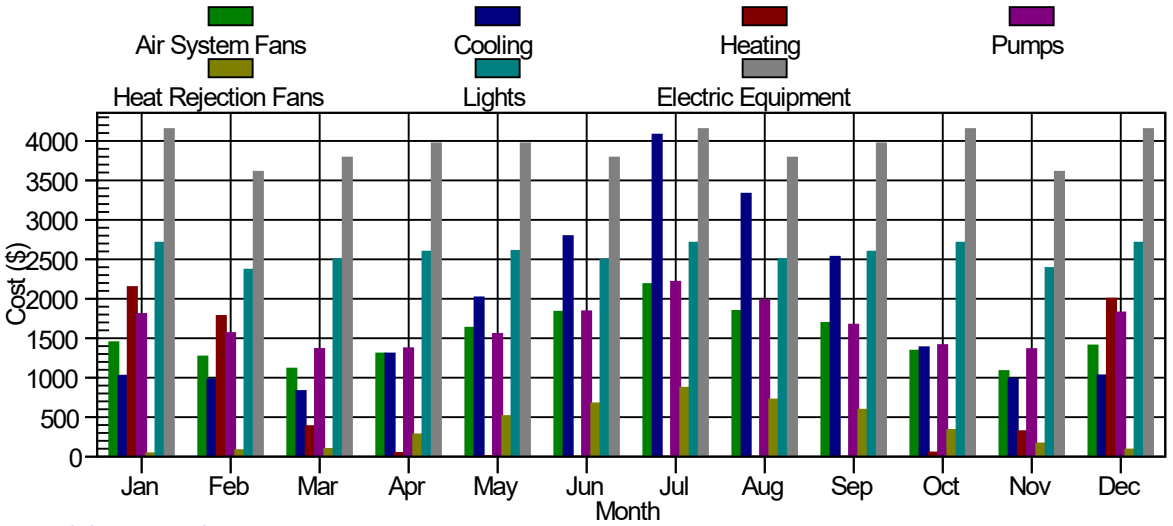
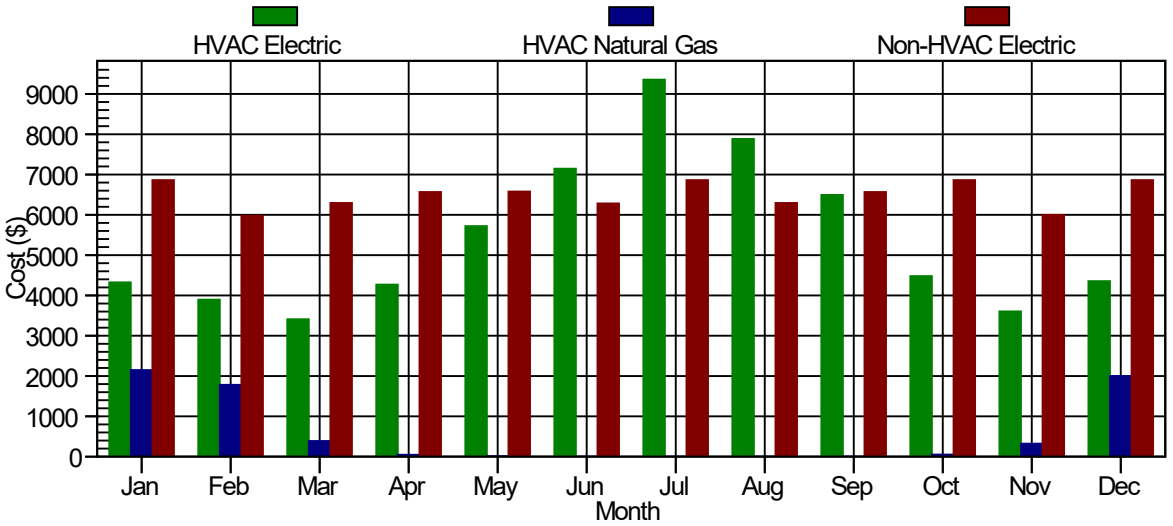


1. HVAC Component Costs

Month	Air System Fans ($)	Cooling ($)	Heating ($)	Pumps ($)	Heat Rejection Fans ($)	HVAC Total ($)
January	1,450	1,026	2,149	1,807	42	6,474
February	1,268	980	1,783	1,566	82	5,679
March	1,115	831	387	1,365	98	3,796
April	1,307	1,307	46	1,373	281	4,314
May	1,633	2,018	3	1,555	514	5,723
June	1,836	2,794	0	1,841	675	7,146
July	2,187	4,080	0	2,215	873	9,355
August	1,846	3,332	0	1,982	723	7,883
September	1,695	2,532	1	1,672	595	6,495
October	1,342	1,386	52	1,413	339	4,532
November	1,084	988	322	1,363	167	3,924
December	1,409	1,030	2,002	1,827	90	6,358
Total	**18,173**	**22,303**	**6,744**	**19,979**	**4,478**	**71,677**

2. Non-HVAC Component Costs

Month	Lights ($)	Electric Equipment ($)	Misc. Electric ($)	Misc. Fuel Use ($)	Non-HVAC Total ($)	Grand Total ($)
January	2,711	4,150	0	0	6,861	13,335
February	2,368	3,609	0	0	5,977	11,656
March	2,504	3,789	0	0	6,294	10,090
April	2,597	3,970	0	0	6,566	10,880
May	2,608	3,970	0	0	6,577	12,300
June	2,494	3,789	0	0	6,283	13,429
July	2,711	4,150	0	0	6,861	16,216
August	2,504	3,789	0	0	6,294	14,177
September	2,597	3,970	0	0	6,566	13,061
October	2,711	4,150	0	0	6,861	11,393
November	2,390	3,609	0	0	5,999	9,923
December	2,711	4,150	0	0	6,861	13,219
Total	**30,905**	**47,096**	**0**	**0**	**78,001**	**149,678**



1. HVAC Costs

Month	Electric ($)	Natural Gas ($)	Fuel Oil ($)	Propane ($)	Remote Hot Water ($)	Remote Steam ($)	Remote Chilled Water ($)
January	4,325	2,149	0	0	0	0	0
February	3,896	1,783	0	0	0	0	0
March	3,409	387	0	0	0	0	0
April	4,268	46	0	0	0	0	0
May	5,720	3	0	0	0	0	0
June	7,146	0	0	0	0	0	0
July	9,355	0	0	0	0	0	0
August	7,883	0	0	0	0	0	0
September	6,493	1	0	0	0	0	0
October	4,480	52	0	0	0	0	0
November	3,603	322	0	0	0	0	0
December	4,355	2,002	0	0	0	0	0
Total	**64,934**	**6,744**	**0**	**0**	**0**	**0**	**0**

2. Non-HVAC Costs

Month	Electric ($)	Natural Gas ($)	Fuel Oil ($)	Propane ($)	Remote Hot Water ($)	Remote Steam ($)
January	6,861	0	0	0	0	0
February	5,977	0	0	0	0	0
March	6,294	0	0	0	0	0
April	6,566	0	0	0	0	0
May	6,577	0	0	0	0	0
June	6,283	0	0	0	0	0
July	6,861	0	0	0	0	0
August	6,294	0	0	0	0	0
September	6,566	0	0	0	0	0
October	6,861	0	0	0	0	0
November	5,999	0	0	0	0	0
December	6,861	0	0	0	0	0
Total	**78,000**	**0**	**0**	**0**	**0**	**0**

1. Monthly Energy Use by System Component

Component	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Air System Fans (kWh)	18377	16076	14138	16564	20703	23267	27716	23400	21480	17013	13742	17852
Cooling												
Electric (kWh)	12998	12416	10533	16561	25573	35414	51712	42224	32094	17568	12528	13054
Natural Gas (Therm)	0	0	0	0	0	0	0	0	0	0	0	0
Fuel Oil (na)	0	0	0	0	0	0	0	0	0	0	0	0
Propane (na)	0	0	0	0	0	0	0	0	0	0	0	0
Remote HW (na)	0	0	0	0	0	0	0	0	0	0	0	0
Remote Steam (na)	0	0	0	0	0	0	0	0	0	0	0	0
Remote CW (na)	0	0	0	0	0	0	0	0	0	0	0	0
Heating												
Electric (kWh)	0	0	0	0	0	0	0	0	0	0	0	0
Natural Gas (Therm)	1847	1533	333	39	3	0	0	0	0	45	277	1721
Fuel Oil (na)	0	0	0	0	0	0	0	0	0	0	0	0
Propane (na)	0	0	0	0	0	0	0	0	0	0	0	0
Remote HW (na)	0	0	0	0	0	0	0	0	0	0	0	0
Remote Steam (na)	0	0	0	0	0	0	0	0	0	0	0	0
Pumps (kWh)	22906	19850	17300	17402	19707	23333	28080	25121	21186	17909	17272	23152
Heat Rej. Fans (kWh)	530	1035	1239	3565	6519	8553	11066	9169	7536	4291	2118	1138
Lighting (kWh)	34356	30019	31742	32910	33049	31603	34356	31742	32910	34356	30296	34356
Electric Eqpt. (kWh)	52601	45740	48027	50314	50314	48027	52601	48027	50314	52601	45740	52601
Misc. Electric (kWh)	0	0	0	0	0	0	0	0	0	0	0	0
Misc. Fuel												
Natural Gas (Therm)	0	0	0	0	0	0	0	0	0	0	0	0
Propane (na)	0	0	0	0	0	0	0	0	0	0	0	0
Remote HW (na)	0	0	0	0	0	0	0	0	0	0	0	0
Remote Steam (na)	0	0	0	0	0	0	0	0	0	0	0	0

1. HVAC Energy Use

Month	Electric (kWh)	Natural Gas (Therm)	Fuel Oil (na)	Propane (na)	Remote HW (na)	Remote Steam (na)	Remote CW (na)
Jan	54,812	1,847	0	0	0	0	0
Feb	49,378	1,533	0	0	0	0	0
Mar	43,211	333	0	0	0	0	0
Apr	54,092	39	0	0	0	0	0
May	72,502	3	0	0	0	0	0
Jun	90,568	0	0	0	0	0	0
Jul	118,574	0	0	0	0	0	0
Aug	99,915	0	0	0	0	0	0
Sep	82,296	0	0	0	0	0	0
Oct	56,782	45	0	0	0	0	0
Nov	45,660	277	0	0	0	0	0
Dec	55,197	1,721	0	0	0	0	0
Totals	822,986	5,799	0	0	0	0	0

2. Non-HVAC Energy Use

Month	Electric (kWh)	Natural Gas (Therm)	Fuel Oil (na)	Propane (na)	Remote HW (na)	Remote Steam (na)
Jan	86,955	0	0	0	0	0
Feb	75,759	0	0	0	0	0
Mar	79,769	0	0	0	0	0
Apr	83,224	0	0	0	0	0
May	83,363	0	0	0	0	0
Jun	79,630	0	0	0	0	0
Jul	86,955	0	0	0	0	0
Aug	79,769	0	0	0	0	0
Sep	83,224	0	0	0	0	0
Oct	86,955	0	0	0	0	0
Nov	76,037	0	0	0	0	0
Dec	86,955	0	0	0	0	0
Totals	988,594	0	0	0	0	0

Annual Component Costs - PROPOSED ANNEX

17-024 JONAS COURTHOUSE - PRELIMINARY 09/22/2017
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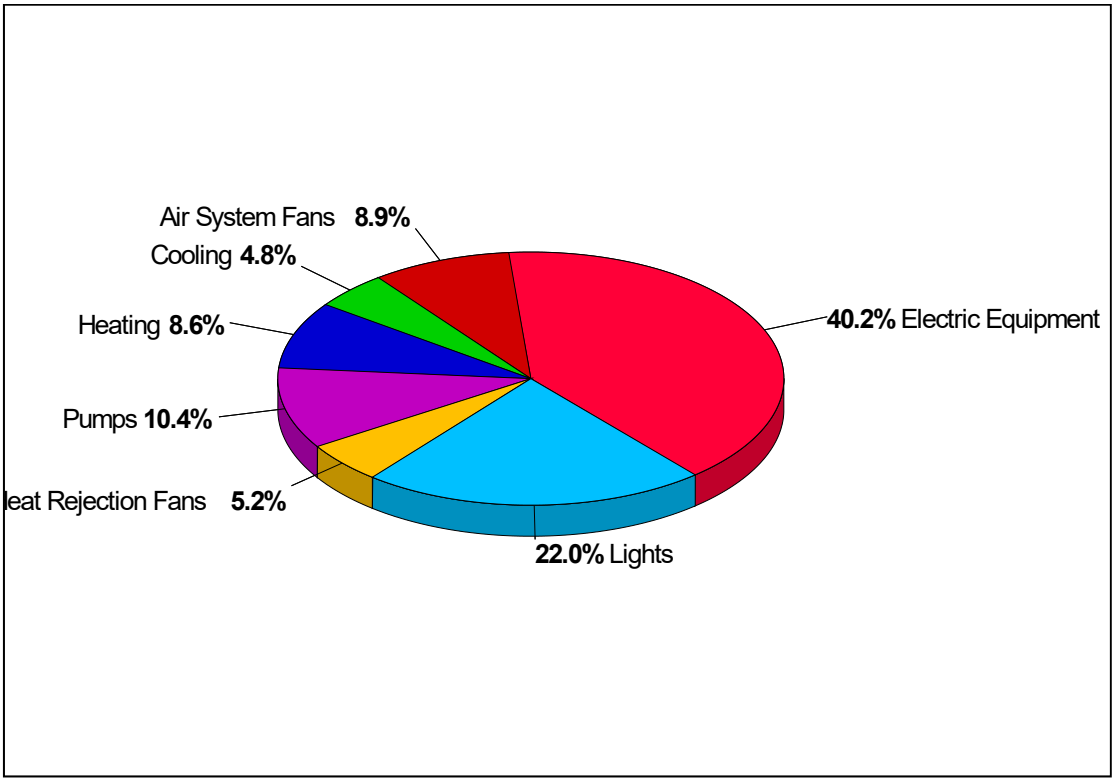
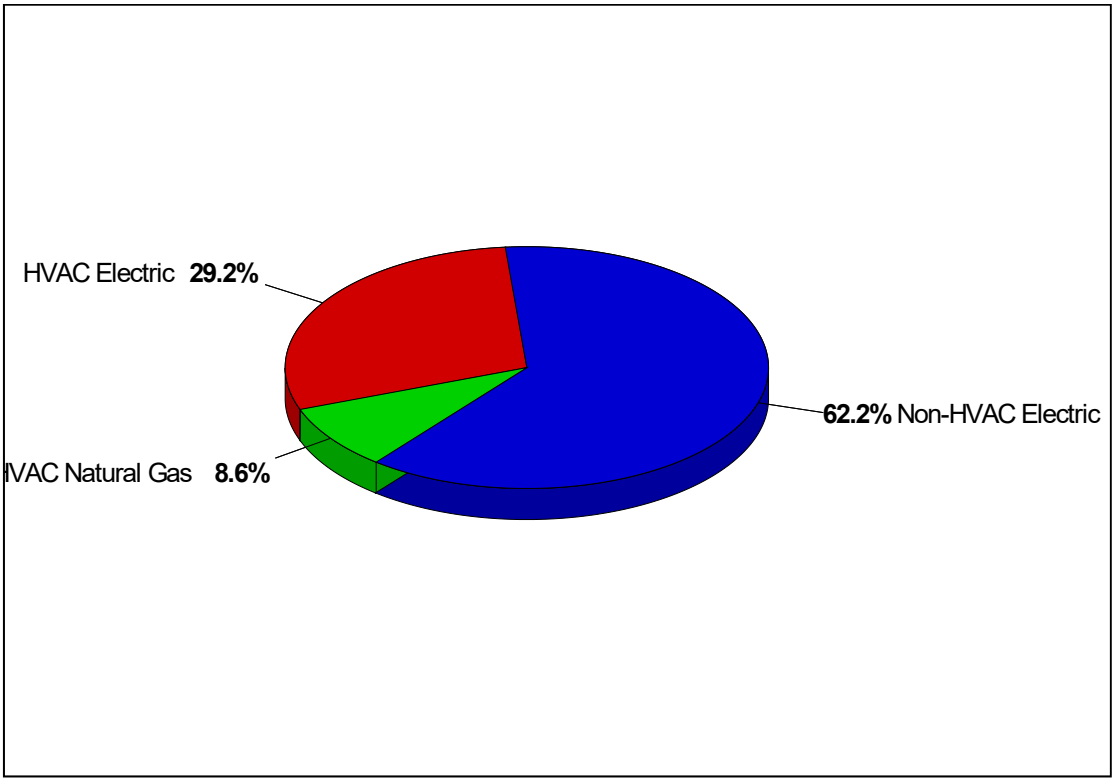


1. Annual Costs

Component	Annual Cost ($)	($/ft²)	Percent of Total (%)
Air System Fans	10,265	0.069	8.9
Cooling	5,476	0.037	4.8
Heating	9,906	0.067	8.6
Pumps	11,951	0.080	10.4
Heat Rejection Fans	6,012	0.040	5.2
HVAC Sub-Total	**43,610**	**0.293**	**37.8**
Lights	25,319	0.170	22.0
Electric Equipment	46,324	0.312	40.2
Misc. Electric	0	0.000	0.0
Misc. Fuel Use	0	0.000	0.0
Non-HVAC Sub-Total	**71,643**	**0.482**	**62.2**
Grand Total	**115,252**	**0.775**	**100.0**

Note: Cost per unit floor area is based on the gross building floor area.

Gross Floor Area ..... **148648.0** ft²
Conditioned Floor Area **148648.0** ft²



1. Annual Costs

Component	Annual Cost ($/yr)	($/ft²)	Percent of Total (%)
HVAC Components			
Electric	33,704	0.227	29.2
Natural Gas	9,906	0.067	8.6
Fuel Oil	0	0.000	0.0
Propane	0	0.000	0.0
Remote Hot Water	0	0.000	0.0
Remote Steam	0	0.000	0.0
Remote Chilled Water	0	0.000	0.0
HVAC Sub-Total	**43,610**	**0.293**	**37.8**
Non-HVAC Components			
Electric	71,644	0.482	62.2
Natural Gas	0	0.000	0.0
Fuel Oil	0	0.000	0.0
Propane	0	0.000	0.0
Remote Hot Water	0	0.000	0.0
Remote Steam	0	0.000	0.0
Non-HVAC Sub-Total	**71,644**	**0.482**	**62.2**
Grand Total	**115,253**	**0.775**	**100.0**

Note: Cost per unit floor area is based on the gross building floor area.

Gross Floor Area ..... **148648.0** ft²
Conditioned Floor Area **148648.0** ft²

Annual HVAC & Non-HVAC Cost Totals - PROPOSED ANNEX

17-024 JONAS COURTHOUSE - PRELIMINARY 09/22/2017
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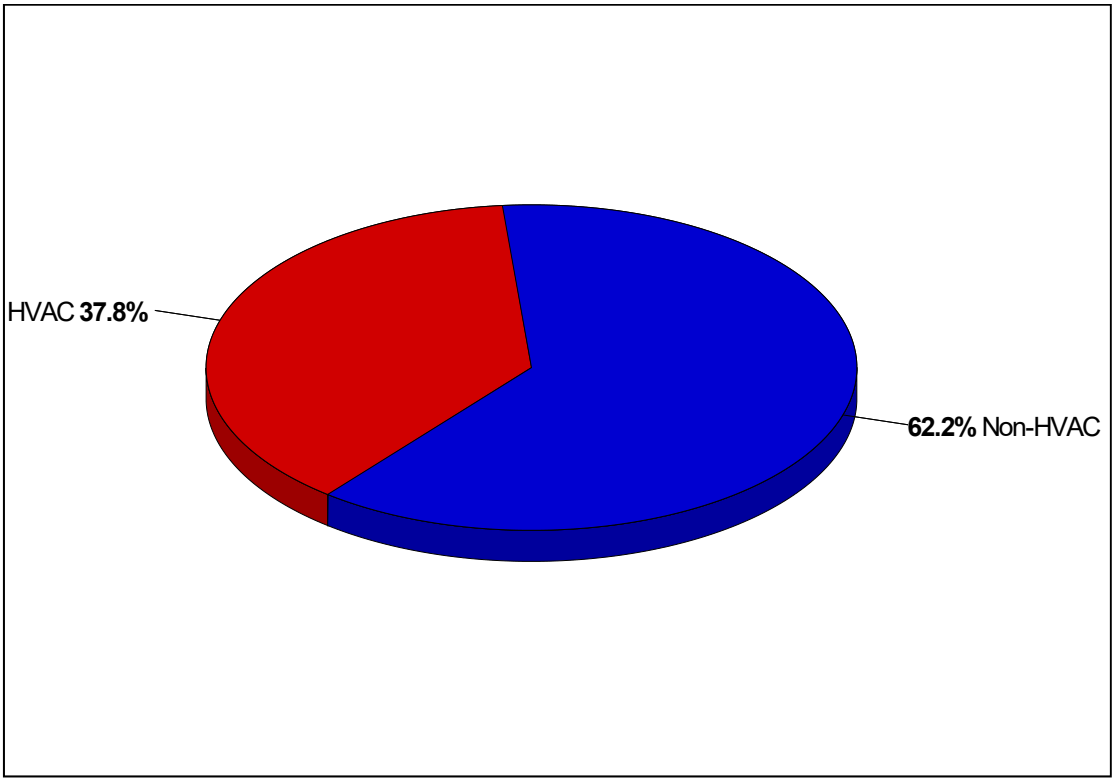


1. Annual Costs

Component	Annual Cost ($/yr)	($/ft²)	Percent of Total (%)
HVAC	43,610	0.293	37.8
Non-HVAC	71,643	0.482	62.2
Grand Total	**115,252**	**0.775**	**100.0**

Note: Cost per unit floor area is based on the gross building floor area.

Gross Floor Area ..... **148648.0** ft²
Conditioned Floor Area **148648.0** ft²

1. Annual Coil Loads

Component	Load (kBTU)	(kBTU/ft²)
Cooling Coil Loads	4,556,573	30.653
Heating Coil Loads	968,352	6.514
Grand Total	**5,524,925**	**37.168**

2. Energy Consumption by System Component

Component	Site Energy (kBTU)	Site Energy (kBTU/ft²)	Source Energy (kBTU)	Source Energy (kBTU/ft²)
Air System Fans	443,910	2.986	1,585,392	10.665
Cooling	236,817	1.593	845,774	5.690
Heating	851,720	5.730	851,720	5.730
Pumps	516,797	3.477	1,845,703	12.417
Heat Rejection Fans	259,995	1.749	928,555	6.247
HVAC Sub-Total	**2,309,239**	**15.535**	**6,057,144**	**40.748**
Lights	1,094,913	7.366	3,910,401	26.307
Electric Equipment	2,003,252	13.477	7,154,471	48.130
Misc. Electric	0	0.000	0	0.000
Misc. Fuel Use	0	0.000	0	0.000
Non-HVAC Sub-Total	**3,098,164**	**20.842**	**11,064,872**	**74.437**
Grand Total	**5,407,403**	**36.377**	**17,122,015**	**115.185**

Notes:
1. 'Cooling Coil Loads' is the sum of all air system cooling coil loads.
2. 'Heating Coil Loads' is the sum of all air system heating coil loads.
3. Site Energy is the actual energy consumed.
4. Source Energy is the site energy divided by the electric generating efficiency (28.0%).
5. Source Energy for fuels equals the site energy value.
6. Energy per unit floor area is based on the gross building floor area.
   Gross Floor Area ..... **148648.0** ft²
   Conditioned Floor Area ..... **148648.0** ft²

Energy Budget by Energy Source - PROPOSED ANNEX

17-024 JONAS COURTHOUSE - PRELIMINARY 09/22/2017
MSWG 07:29AM

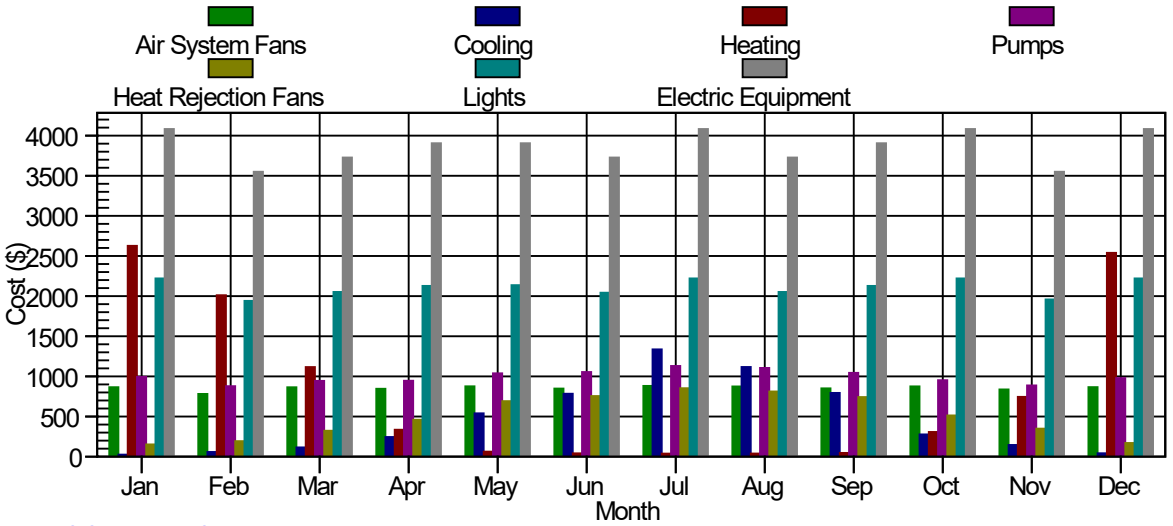
1. Annual Coil Loads

Component	Load (kBTU)	(kBTU/ft²)
Cooling Coil Loads	4,556,573	30.653
Heating Coil Loads	968,352	6.514
Grand Total	**5,524,925**	**37.168**

2. Energy Consumption by Energy Source

Component	Site Energy (kBTU)	Site Energy (kBTU/ft²)	Source Energy (kBTU)	Source Energy (kBTU/ft²)
HVAC Components				
Electric	1,457,528	9.805	5,205,460	35.019
Natural Gas	851,720	5.730	851,720	5.730
Fuel Oil	0	0.000	0	0.000
Propane	0	0.000	0	0.000
Remote Hot Water	0	0.000	0	0.000
Remote Steam	0	0.000	0	0.000
Remote Chilled Water	0	0.000	0	0.000
HVAC Sub-Total	**2,309,248**	**15.535**	**6,057,179**	**40.749**
Non-HVAC Components				
Electric	3,098,202	20.843	11,065,007	74.438
Natural Gas	0	0.000	0	0.000
Fuel Oil	0	0.000	0	0.000
Propane	0	0.000	0	0.000
Remote Hot Water	0	0.000	0	0.000
Remote Steam	0	0.000	0	0.000
Non-HVAC Sub-Total	**3,098,202**	**20.843**	**11,065,007**	**74.438**
Grand Total	**5,407,450**	**36.378**	**17,122,186**	**115.186**

Notes:
1. 'Cooling Coil Loads' is the sum of all air system cooling coil loads.
2. 'Heating Coil Loads' is the sum of all air system heating coil loads.
3. Site Energy is the actual energy consumed.
4. Source Energy is the site energy divided by the electric generating efficiency (28.0%).
5. Source Energy for fuels equals the site energy value.
6. Energy per unit floor area is based on the gross building floor area.
   Gross Floor Area ..... **148648.0** ft²
   Conditioned Floor Area ..... **148648.0** ft²



1. HVAC Component Costs

Month	Air System Fans ($)	Cooling ($)	Heating ($)	Pumps ($)	Heat Rejection Fans ($)	HVAC Total ($)
January	865	25	2,627	994	153	4,664
February	781	58	2,011	878	193	3,921
March	864	114	1,116	944	322	3,360
April	846	244	335	946	460	2,831
May	876	540	62	1,038	692	3,208
June	848	784	41	1,054	755	3,482
July	881	1,336	38	1,130	852	4,237
August	874	1,117	39	1,105	812	3,947
September	851	794	46	1,044	742	3,477
October	875	277	307	952	513	2,924
November	837	146	745	887	348	2,963
December	866	42	2,539	979	170	4,596
Total	**10,265**	**5,476**	**9,906**	**11,951**	**6,012**	**43,610**

2. Non-HVAC Component Costs

Month	Lights ($)	Electric Equipment ($)	Misc. Electric ($)	Misc. Fuel Use ($)	Non-HVAC Total ($)	Grand Total ($)
January	2,221	4,082	0	0	6,303	10,967
February	1,940	3,550	0	0	5,490	9,411
March	2,052	3,727	0	0	5,779	9,139
April	2,127	3,905	0	0	6,032	8,863
May	2,136	3,905	0	0	6,041	9,249
June	2,043	3,727	0	0	5,770	9,252
July	2,221	4,082	0	0	6,303	10,540
August	2,052	3,727	0	0	5,779	9,726
September	2,127	3,905	0	0	6,032	9,509
October	2,221	4,082	0	0	6,303	9,227
November	1,958	3,550	0	0	5,508	8,471
December	2,221	4,082	0	0	6,303	10,899
Total	**25,319**	**46,324**	**0**	**0**	**71,643**	**115,252**

Monthly Energy Costs - PROPOSED ANNEX

17-024 JONAS COURTHOUSE - PRELIMINARY 09/22/2017
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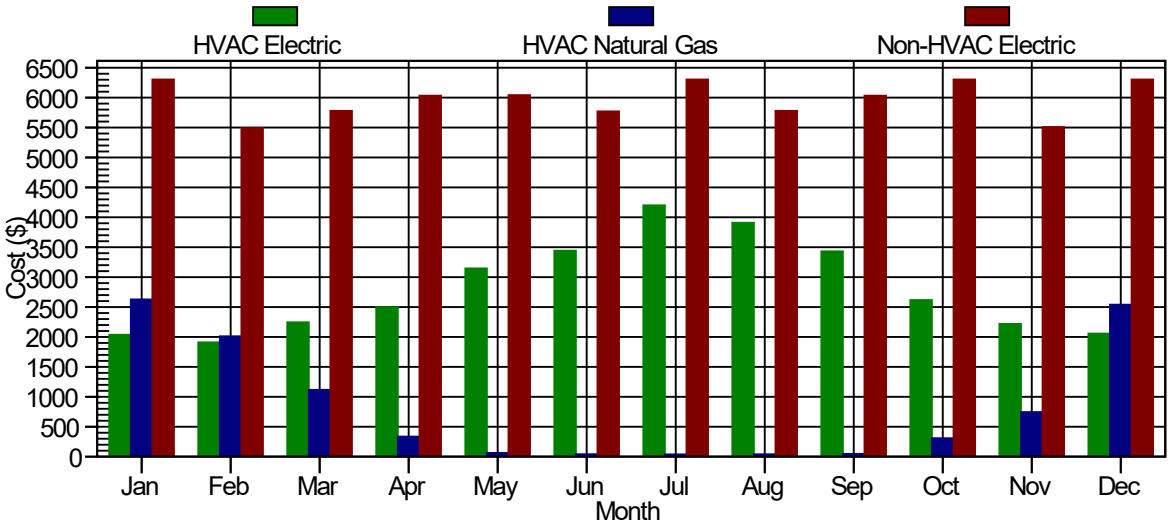

1. HVAC Costs

Month	Electric ($)	Natural Gas ($)	Fuel Oil ($)	Propane ($)	Remote Hot Water ($)	Remote Steam ($)	Remote Chilled Water ($)
January	2,037	2,627	0	0	0	0	0
February	1,910	2,011	0	0	0	0	0
March	2,245	1,116	0	0	0	0	0
April	2,495	335	0	0	0	0	0
May	3,146	62	0	0	0	0	0
June	3,441	41	0	0	0	0	0
July	4,200	38	0	0	0	0	0
August	3,908	39	0	0	0	0	0
September	3,431	46	0	0	0	0	0
October	2,617	307	0	0	0	0	0
November	2,218	745	0	0	0	0	0
December	2,056	2,539	0	0	0	0	0
Total	**33,704**	**9,906**	**0**	**0**	**0**	**0**	**0**

2. Non-HVAC Costs

Month	Electric ($)	Natural Gas ($)	Fuel Oil ($)	Propane ($)	Remote Hot Water ($)	Remote Steam ($)
January	6,303	0	0	0	0	0
February	5,490	0	0	0	0	0
March	5,779	0	0	0	0	0
April	6,032	0	0	0	0	0
May	6,041	0	0	0	0	0
June	5,770	0	0	0	0	0
July	6,303	0	0	0	0	0
August	5,779	0	0	0	0	0
September	6,032	0	0	0	0	0
October	6,303	0	0	0	0	0
November	5,508	0	0	0	0	0
December	6,303	0	0	0	0	0
Total	**71,644**	**0**	**0**	**0**	**0**	**0**

1. Monthly Energy Use by System Component

Component	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Air System Fans (kWh)	10967	9901	10949	10720	11106	10751	11167	11079	10784	11094	10609	10975
Cooling												
Electric (kWh)	315	733	1451	3094	6842	9937	16934	14156	10060	3511	1847	528
Natural Gas (Therm)	0	0	0	0	0	0	0	0	0	0	0	0
Fuel Oil (na)	0	0	0	0	0	0	0	0	0	0	0	0
Propane (na)	0	0	0	0	0	0	0	0	0	0	0	0
Remote HW (na)	0	0	0	0	0	0	0	0	0	0	0	0
Remote Steam (na)	0	0	0	0	0	0	0	0	0	0	0	0
Remote CW (na)	0	0	0	0	0	0	0	0	0	0	0	0
Heating												
Electric (kWh)	0	0	0	0	0	0	0	0	0	0	0	0
Natural Gas (Therm)	2259	1729	959	288	54	35	32	34	40	264	640	2183
Fuel Oil (na)	0	0	0	0	0	0	0	0	0	0	0	0
Propane (na)	0	0	0	0	0	0	0	0	0	0	0	0
Remote HW (na)	0	0	0	0	0	0	0	0	0	0	0	0
Remote Steam (na)	0	0	0	0	0	0	0	0	0	0	0	0
Pumps (kWh)	12598	11130	11968	11985	13154	13360	14318	14008	13233	12066	11239	12405
Heat Rej. Fans (kWh)	1933	2443	4086	5831	8766	9564	10803	10286	9410	6503	4416	2157
Lighting (kWh)	28146	24593	26006	26962	27076	25892	28146	26006	26962	28146	24821	28146
Electric Eqpt. (kWh)	51739	44990	47240	49489	49489	47240	51739	47240	49489	51739	44990	51739
Misc. Electric (kWh)	0	0	0	0	0	0	0	0	0	0	0	0
Misc. Fuel												
Natural Gas (Therm)	0	0	0	0	0	0	0	0	0	0	0	0
Propane (na)	0	0	0	0	0	0	0	0	0	0	0	0
Remote HW (na)	0	0	0	0	0	0	0	0	0	0	0	0
Remote Steam (na)	0	0	0	0	0	0	0	0	0	0	0	0

Monthly Energy Use by Energy Type - PROPOSED ANNEX

17-024 JONAS COURTHOUSE - PRELIMINARY 09/22/2017
MSWG 07:29AM

1. HVAC Energy Use

Month	Electric (kWh)	Natural Gas (Therm)	Fuel Oil (na)	Propane (na)	Remote HW (na)	Remote Steam (na)	Remote CW (na)
Jan	25,812	2,259	0	0	0	0	0
Feb	24,206	1,729	0	0	0	0	0
Mar	28,450	959	0	0	0	0	0
Apr	31,627	288	0	0	0	0	0
May	39,870	54	0	0	0	0	0
Jun	43,617	35	0	0	0	0	0
Jul	53,227	32	0	0	0	0	0
Aug	49,535	34	0	0	0	0	0
Sep	43,491	40	0	0	0	0	0
Oct	33,172	264	0	0	0	0	0
Nov	28,107	640	0	0	0	0	0
Dec	26,063	2,183	0	0	0	0	0
Totals	427,177	8,517	0	0	0	0	0

2. Non-HVAC Energy Use

Month	Electric (kWh)	Natural Gas (Therm)	Fuel Oil (na)	Propane (na)	Remote HW (na)	Remote Steam (na)
Jan	79,885	0	0	0	0	0
Feb	69,584	0	0	0	0	0
Mar	73,246	0	0	0	0	0
Apr	76,452	0	0	0	0	0
May	76,566	0	0	0	0	0
Jun	73,132	0	0	0	0	0
Jul	79,885	0	0	0	0	0
Aug	73,246	0	0	0	0	0
Sep	76,452	0	0	0	0	0
Oct	79,885	0	0	0	0	0
Nov	69,813	0	0	0	0	0
Dec	79,885	0	0	0	0	0
Totals	908,031	0	0	0	0	0

1. REPORT AND PROJECT INFORMATION

General

Simulation Program Name and Version ..... **Hourly Analysis Program 5.10**
Simulation Weather File Name ..... **Charlotte, North Carolina (TM2)**

Building Designations

Proposed Building ..... **PROPOSED ANNEX**
Baseline - 0° ..... **[B000] BASELINE ANNEX**
Baseline - 90° ..... **n/a**
Baseline - 180° ..... **n/a**
Baseline - 270° ..... **n/a**

Space Summary

	Proposed Design	Baseline
Conditioned Floor Area (ft²)	148,648	150,027
Unconditioned Floor Area (ft²)	0	0
Total Floor Area (ft²)	148,648	150,027

2. MINIMUM ENERGY PERFORMANCE CALCULATOR

SHADING AND FENESTRATION

Building Massing and Zoning

Above-Grade Wall & Vertical Glazing Areas

Orientation	Baseline Design (0° rotation)			Proposed Design		
	Gross Above-Grade Wall Area	Vertical Glazing Area		Gross Above-Grade Wall Area	Vertical Glazing Area	
	(ft²)	(ft²)	(% WWR)	(ft²)	(ft²)	(% WWR)
North	0	0	0.0	0	0	0.0
North-Northeast	0	0	0.0	0	0	0.0
Northeast	21,600	2,592	12.0	21,600	2,592	12.0
East-Northeast	0	0	0.0	0	0	0.0
East	0	0	0.0	0	0	0.0
East-Southeast	0	0	0.0	0	0	0.0
Southeast	3,328	768	23.1	3,328	768	23.1
South-Southeast	0	0	0.0	0	0	0.0
South	0	0	0.0	0	0	0.0
South-Southwest	0	0	0.0	0	0	0.0
Southwest	30,304	3,888	12.8	30,304	3,888	12.8
West-Southwest	0	0	0.0	0	0	0.0
West	0	0	0.0	0	0	0.0
West-Northwest	0	0	0.0	0	0	0.0
Northwest	23,296	5,376	23.1	23,296	5,376	23.1
North-Northwest	0	0	0.0	0	0	0.0
Total	**78,528**	**12,624**	**16.1**	**78,528**	**12,624**	**16.1**

Roof & Skylight Areas

Baseline Design (0° rotation)			Proposed Design		
Gross Roof Area	Skylight Area		Gross Roof Area	Skylight Area	
(ft²)	(ft²)	(%)	(ft²)	(ft²)	(%)
15,699	0	0.0	15,699	0	0.0

Note: In these tables, roof and skylight surfaces with slope of 60° or more (from horizontal) are treated as walls and vertical glazing, as according to

LEED v4 EA Credit Optimize Energy Performance Summary Report

17-024 JONAS COURTHOUSE - PRELIMINARY 09/22/2017
MSWG 07:29AM

ASHRAE 90.1 Section 3.

PERFORMANCE OUTPUTS

Energy Sources

Energy Type	Energy Consumption Units	Demand Units	Utility Rate Name	Utility Rate Structure
Electric	kWh	kW	Sample Electric Rate	
Natural Gas	Therm	MBH	Sample Fuel Rate	

Performance Rating Method Compliance

Baseline Energy Summary by End Use

End Use	Unregulated ?	Baseline Design Energy Type	Units of Annual Energy & Peak Demand	Baseline (0° rotation)	Baseline (90° rotation)	Baseline (180° rotation)	Baseline (270° rotation)	Baseline Design Total (Average of 4 Rotations)
Interior Lighting		Electric	Consumption [kWh]	391,685.0	0.0	0.0	0.0	391,685.0
			Demand [kW]	145.4	0.0	0.0	0.0	145.4
Space Heating		Natural Gas	Consumption [Therm]	5,798.7	0.0	0.0	0.0	5,798.7
			Demand [MBH]	2,235.8	0.0	0.0	0.0	2,235.8
Space Cooling		Electric	Consumption [kWh]	282,675.3	0.0	0.0	0.0	282,675.3
			Demand [kW]	213.8	0.0	0.0	0.0	213.8
Pumps		Electric	Consumption [kWh]	253,219.0	0.0	0.0	0.0	253,219.0
			Demand [kW]	53.3	0.0	0.0	0.0	53.3
Heat Rejection		Electric	Consumption [kWh]	56,757.5	0.0	0.0	0.0	56,757.5
			Demand [kW]	24.8	0.0	0.0	0.0	24.8
Fans - Interior		Electric	Consumption [kWh]	230,326.3	0.0	0.0	0.0	230,326.3
			Demand [kW]	103.9	0.0	0.0	0.0	103.9
Receptacle Equipment	X	Electric	Consumption [kWh]	596,907.0	0.0	0.0	0.0	596,907.0
			Demand [kW]	236.5	0.0	0.0	0.0	236.5
Total energy consumption by energy type		Electric	kWh	1,811,570.3	0.0	0.0	0.0	1,811,570.3
		Natural Gas	Therm	5,798.7	0.0	0.0	0.0	5,798.7

(1) This form determines compliance using cost calculations from Section 1.9. Process Energy Costs should be modeled to accurately reflect the proposed building. Process Energy must be the same in the baseline and proposed cases, unless an exceptional calculation is used. Process energy costs must be at least 25% of the total baseline energy costs. Any exceptions must be supported by a narrative and/or other supporting documentation.
(2) In this project Process Energy is 31.5% of total baseline energy cost.

Baseline Building Annual Energy Cost by Energy Type

Energy Type		Baseline (0° rotation) ($)	Baseline (90° rotation) ($)	Baseline (180° rotation) ($)	Baseline (270° rotation) ($)	Baseline Design Total ($)
Electric	kWh	142,933	0	0	0	142,933
Natural Gas	Therm	6,744	0	0	0	6,744
Baseline Annual Energy Cost		**149,677**	**0**	**0**	**0**	**149,677**

Proposed Energy Summary by End Use

End Use	Unregulated ?	Energy Type	Units of Annual Energy and Peak Demand	Baseline	Proposed	Energy / Demand Savings per End Use	End Use Percent Contribution to Total Energy Savings	End Use Percent Contribution to Total Cost Savings	Percent of Total Proposed Site Energy Consumption
Interior Lighting		Electric	Consumption [kWh]	391,685	320,898	18.1 %	17.8 %	16.2 %	20.2 %
			Demand [kW]	145.4	118.9	18.2 %			
Space Heating		Natural Gas	Consumption [Therm]	5,799	8,517	-46.9 %	-0.7 %	-9.2 %	0.5 %
			Demand [MBH]	2,235.8	1,223.8	45.3 %			
Space Cooling		Electric	Consumption [kWh]	282,675	69,407	75.4 %	53.8 %	48.9 %	4.4 %
			Demand [kW]	213.8	174.6	18.3 %			
Pumps		Electric	Consumption [kWh]	253,219	151,463	40.2 %	25.7 %	23.3 %	9.6 %
			Demand [kW]	53.3	26.4	50.4 %			
Heat Rejection		Electric	Consumption [kWh]	56,758	76,200	-34.3 %	-4.9 %	-4.5 %	4.8 %
			Demand [kW]	24.8	18.3	26.3 %			
Fans - Interior		Electric	Consumption [kWh]	230,326	130,112	43.5 %	25.3 %	23.0 %	8.2 %
			Demand [kW]	103.9	18.2	82.5 %			
Receptacle Equipment	X	Electric	Consumption [kWh]	596,907	587,120	1.6 %	2.5 %	2.2 %	37.0 %
			Demand [kW]	236.5	232.8	1.6 %			

Performance Rating Energy Consumption and Cost by Fuel Type - Performance Rating Method Compliance

Energy Type	Site Energy Units	Baseline		Proposed		Percent Savings	
		Site Energy Use (Units shown per energy type)	Cost($)	Site Energy Use (Units shown per energy type)	Cost ($)	Site Energy Use	Cost
Electric	kWh	1,811,570.3	142,933	1,335,200.0	105,347	26.3%	26.3%
Natural Gas	Therm	5,798.7	6,744	8,517.2	9,905	-46.9%	-46.9%
Energy Model Subtotal	**kWh**	**1,981,520.4**	**149,677**	**1,584,824.5**	**115,253**	**20.0%**	**23.0%**

Unmet Loads

Unmet Loads	Baseline Building (0° rotation)	Proposed Building	Difference
Number of hours heating loads not met	3	377	-374
Number of hours cooling loads not met	52	1	+51
Totals	55	378	-323
Compliance	No		

3. EA CREDIT POINTS REFERENCE TABLE

No points table is available for LEED v4 using ASHRAE Std 90.1-2013.